AC:

TEST EQUIPMENT OPPERATION

UNCLASSIFIED:

3 Hour Conference W/2 Hr PE3

Safety & Environmental Impact: “ LOW ”

AC: Test Equipment

Terminal Learning Objective

ACTION:

Calculate the Voltage, Period, Pulse Width & Frequency.

CONDITIONS:

Without Reference and Given a Sweep Generator & Oscilloscope, & associated test leads.

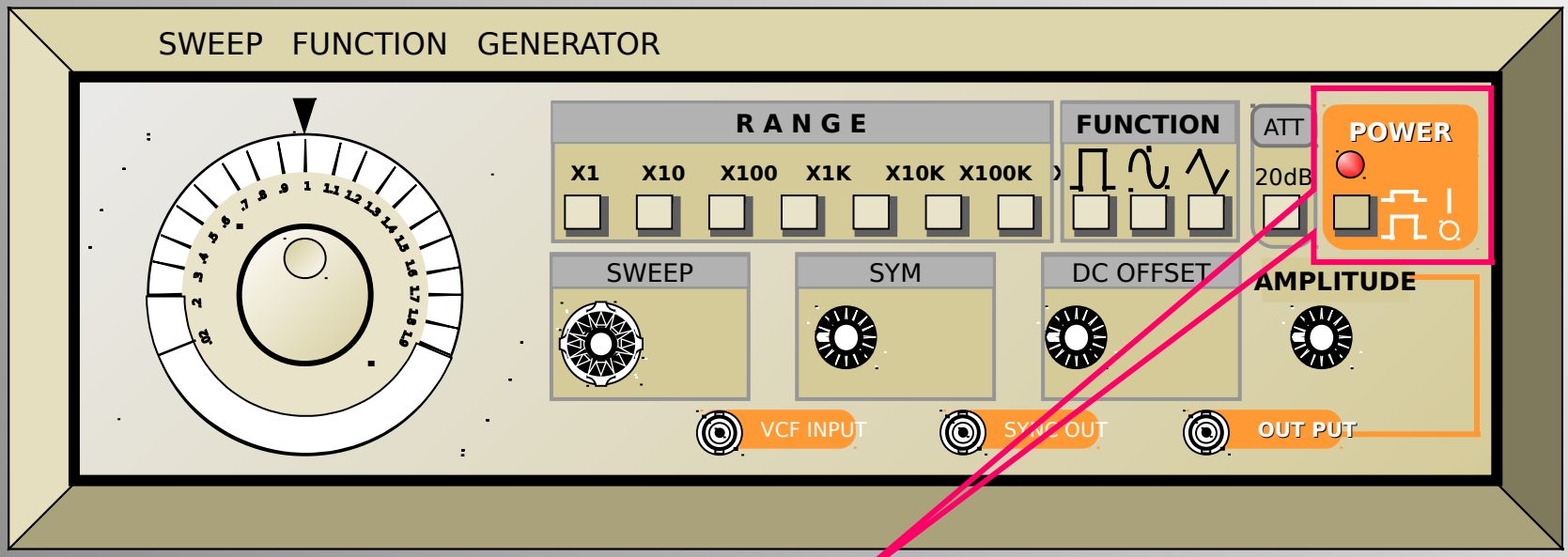
STANDARD:

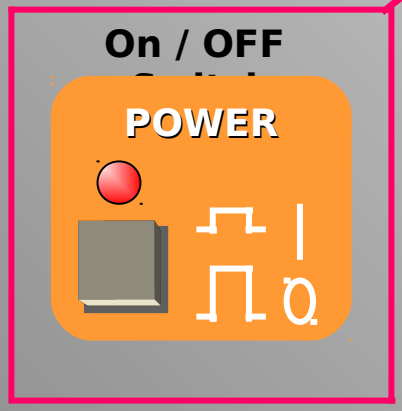
A minimum of 7 out of 10 correct answers, 70% .

F-Gen; PWR Sw.

AC: Test Equipment

Sweep Function Generator; Power Switch.

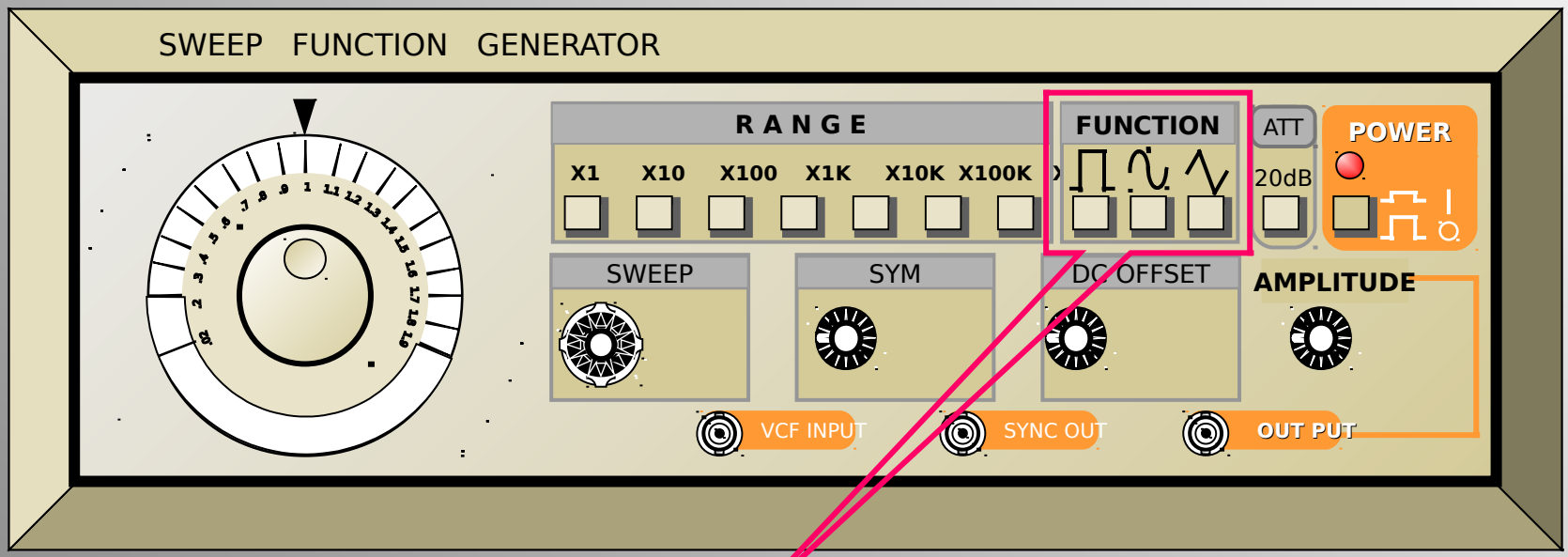


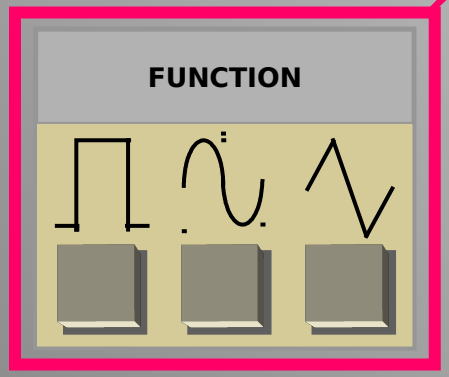


Function Sw.

AC: Test Equipment

Sweep Function Generator; Function Switch.

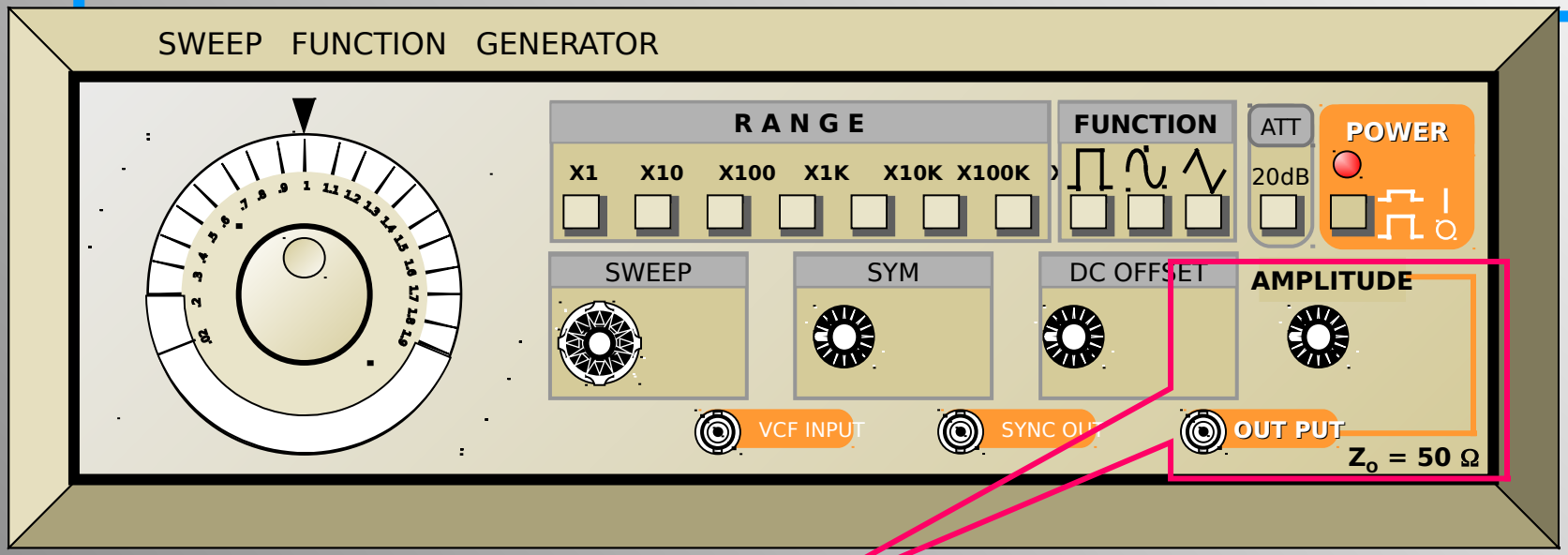


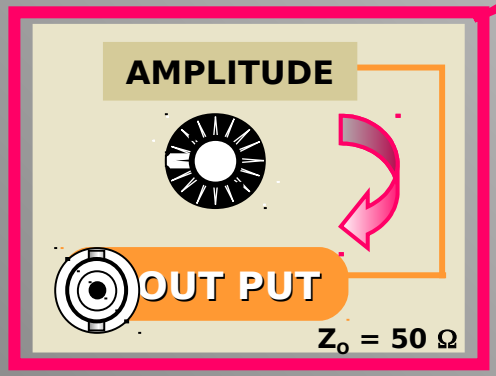


Amplitude

AC: Test Equipment

Sweep Function Generator : Amplitude Control Knob & Output Terminal

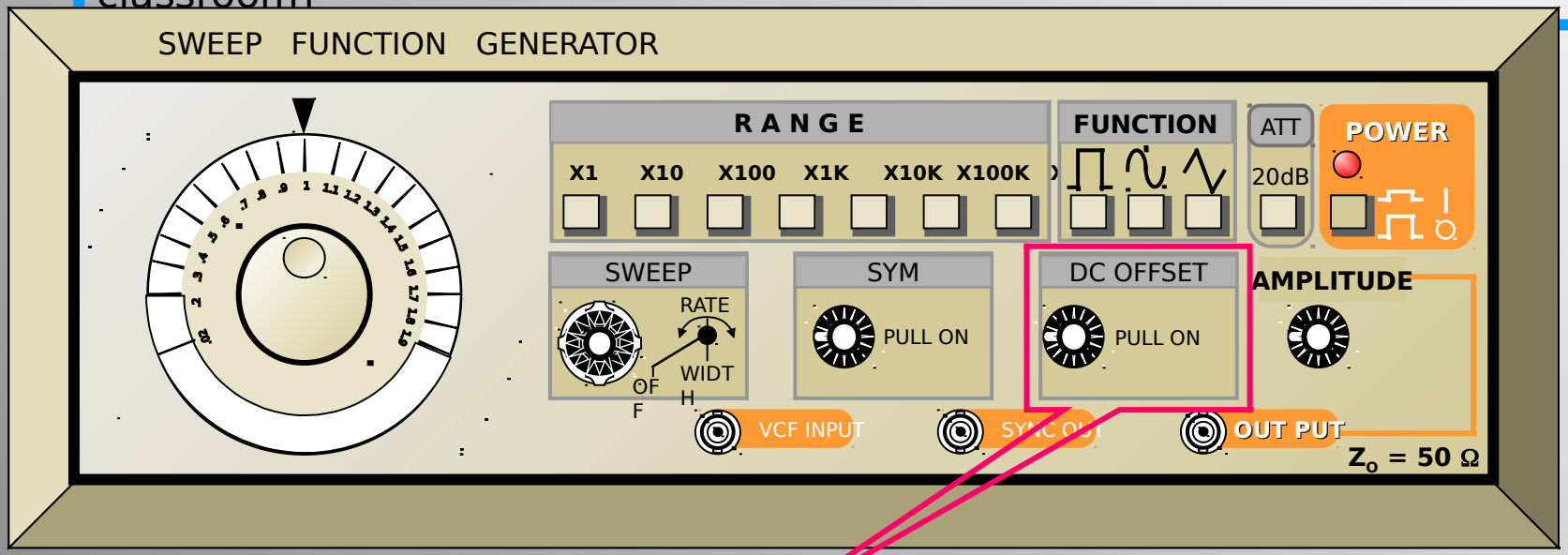


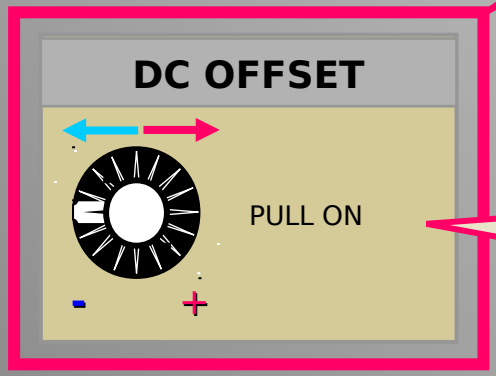


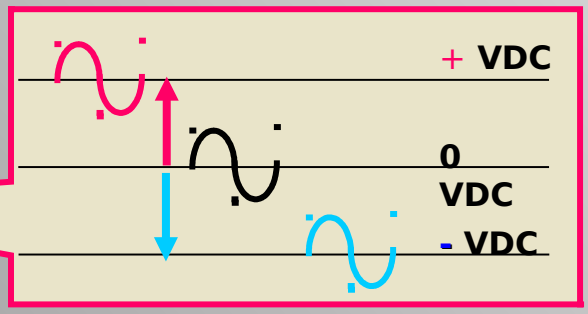
DC Offset

AC: Test Equipment

Sweep Function Generator: DC Offset. [Not used in the classroom]



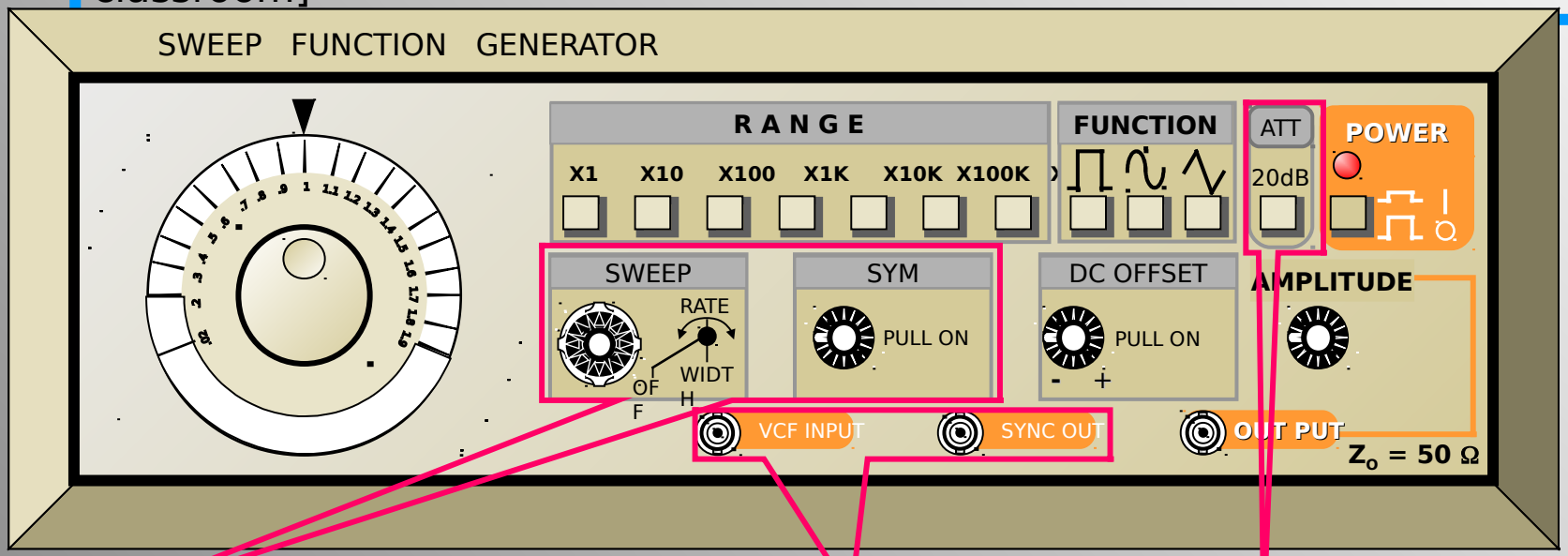


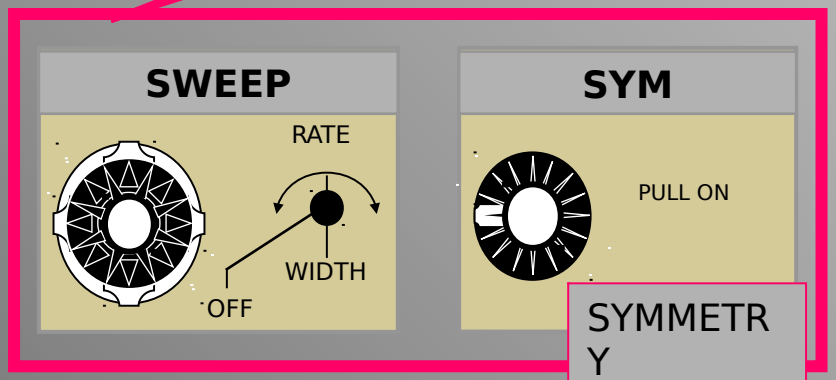


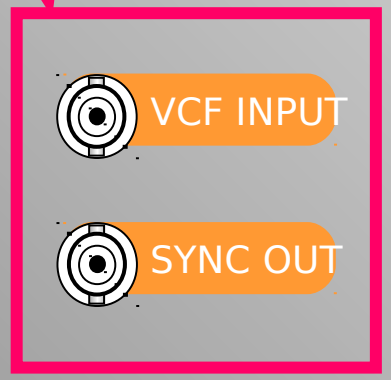
Unused Functions

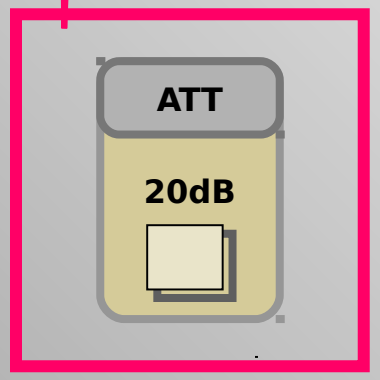
AC: Test Equipment

Function Generator; SWEEP, SYM & ATT [Not used in the classroom]





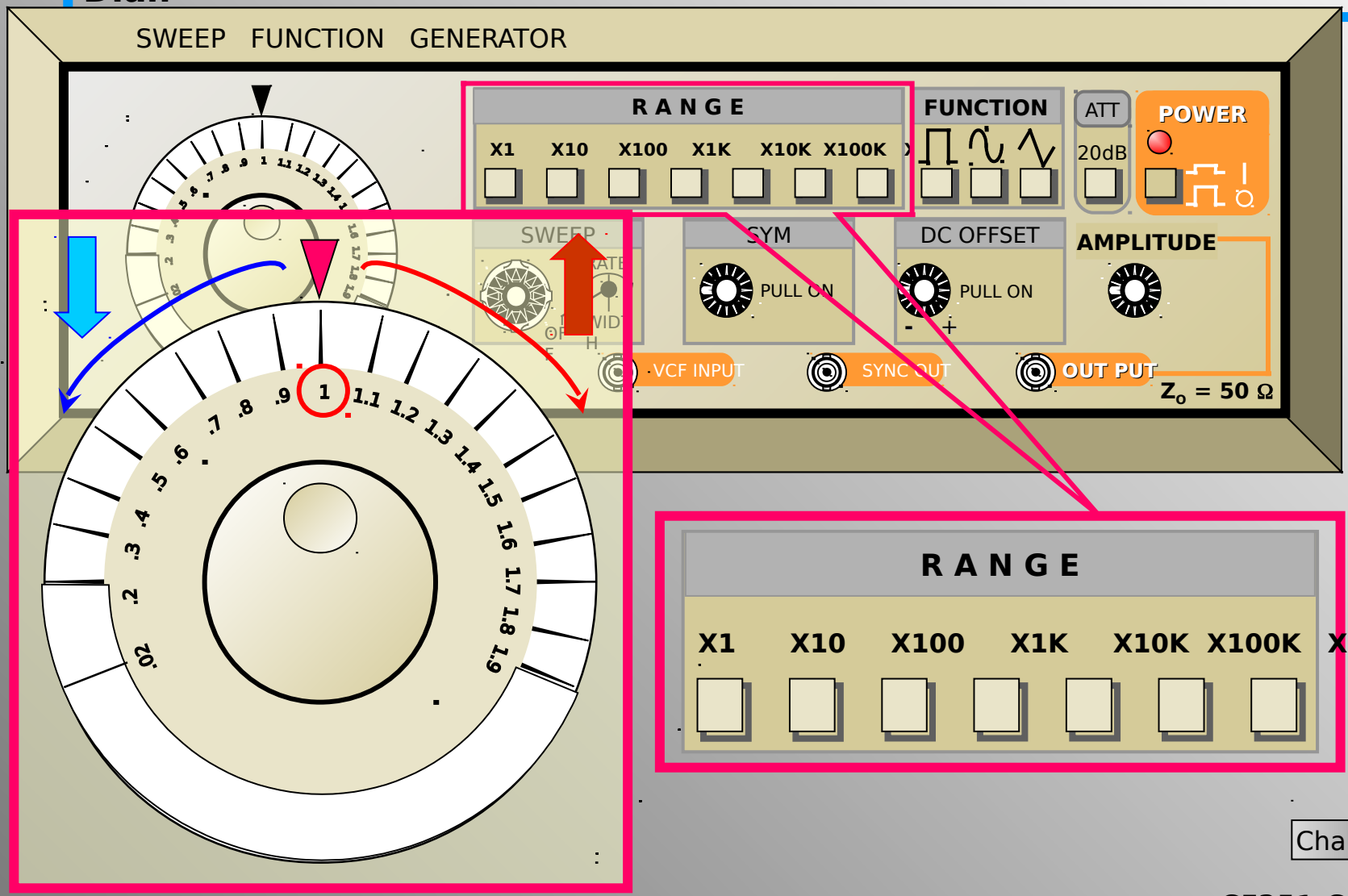




Multiplier Dial

AC: Test Equipment

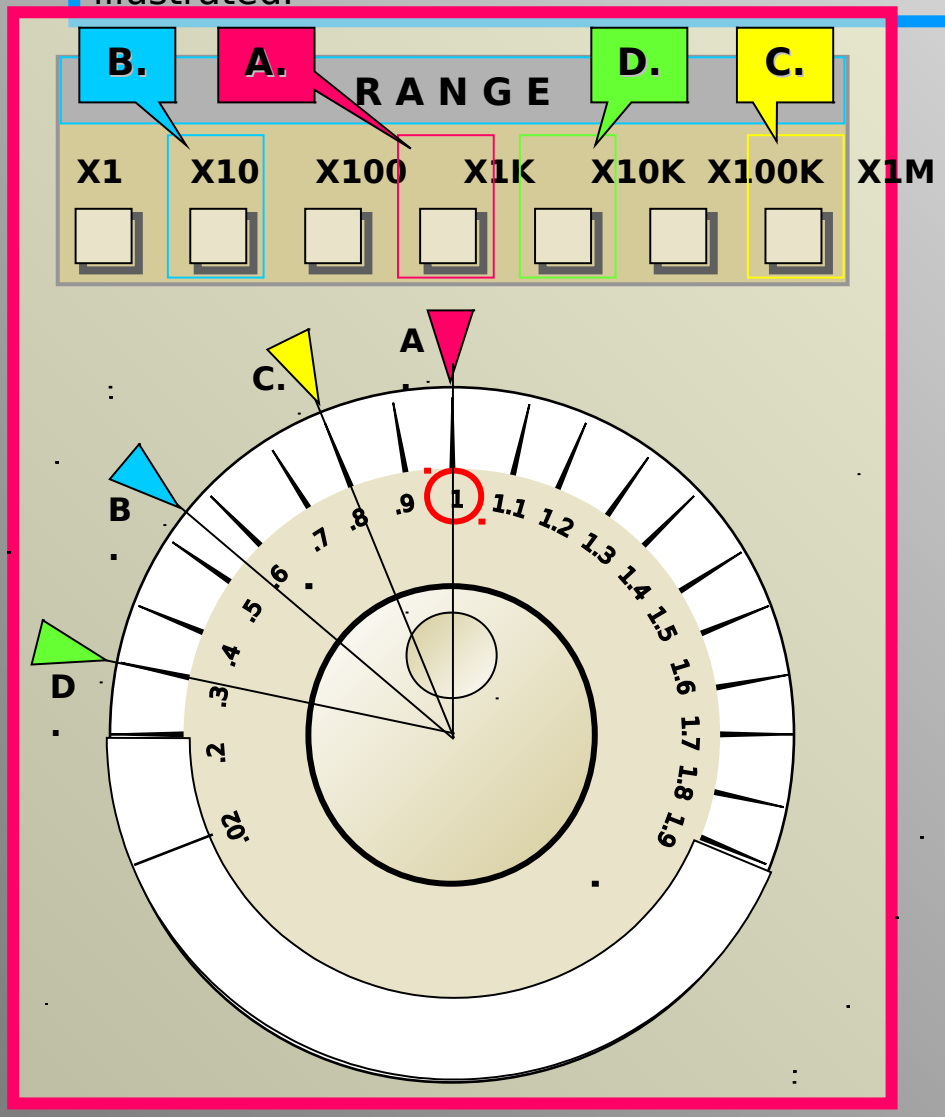
Sweep Function Generator; Range Switches & Multiplier Dial.



Challenge

AC: Test Equipment

What is the output Freq ? Reference the Range Sw & Dial position as illustrated.



A. [Range 1K] X [Dial 1] =

A. Frequency = 1 KHz

B. Frequency = _____

C. Frequency = _____

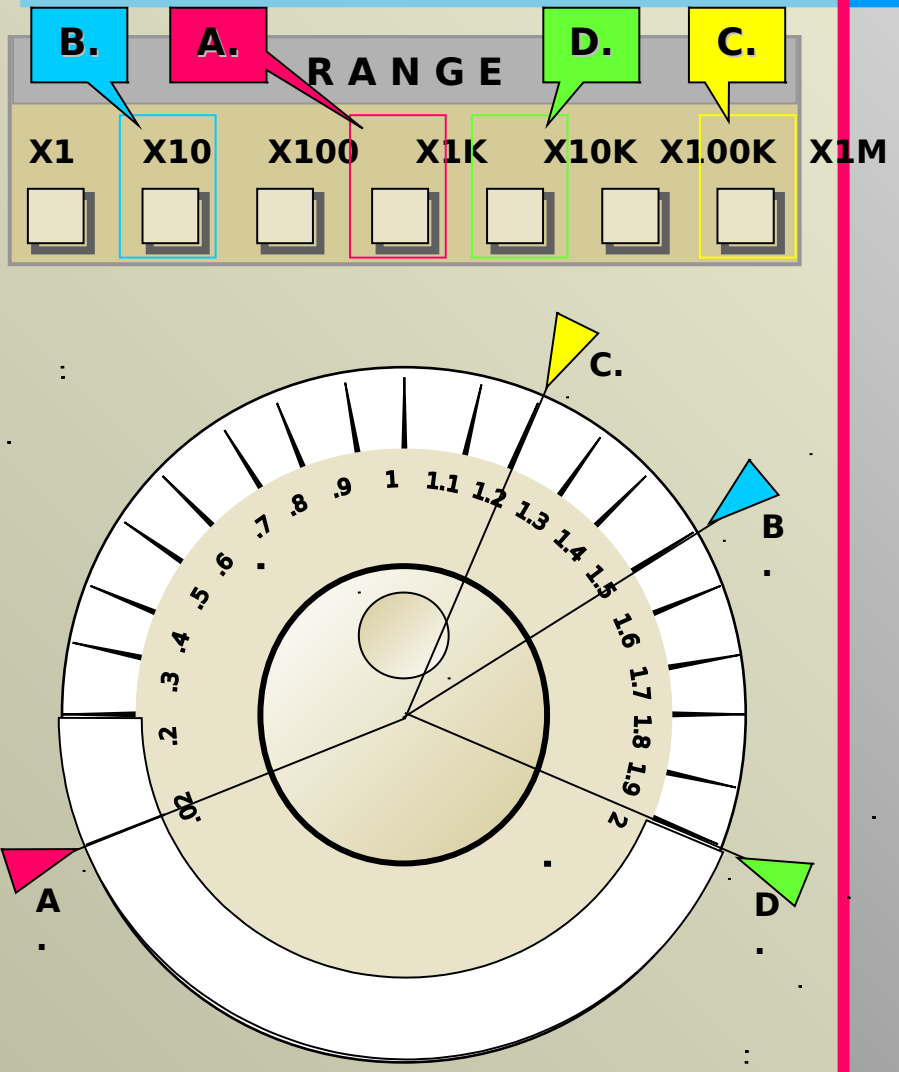
D. Frequency = _____

E. The Range is X1K. Rotating the Multiplier Dial clockwise from the reference mark of 1, Increases / Decreases the frequency at the output.

Answers

AC: Test Equipment

What is the output Freq ? Reference the Range Sw & Dial position as illustrated.



A. **Frequency = _____**

B. **Frequency = _____**

C. **Frequency = _____**

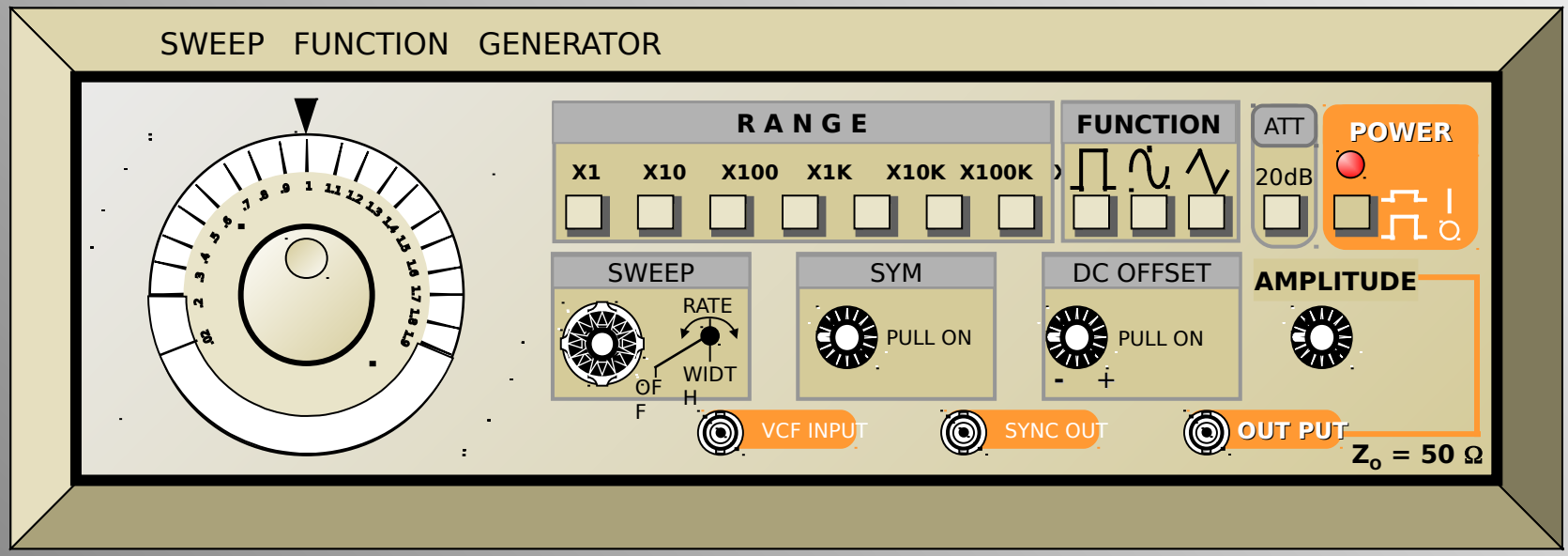
D. **Frequency = _____**

E. The Range is X1K. Rotating the Multiplier Dial counterclockwise from the reference mark of 1, Increases / Decreases the frequency at the output .

Answers

AC: Test Equipment

Sweep Function Generator;

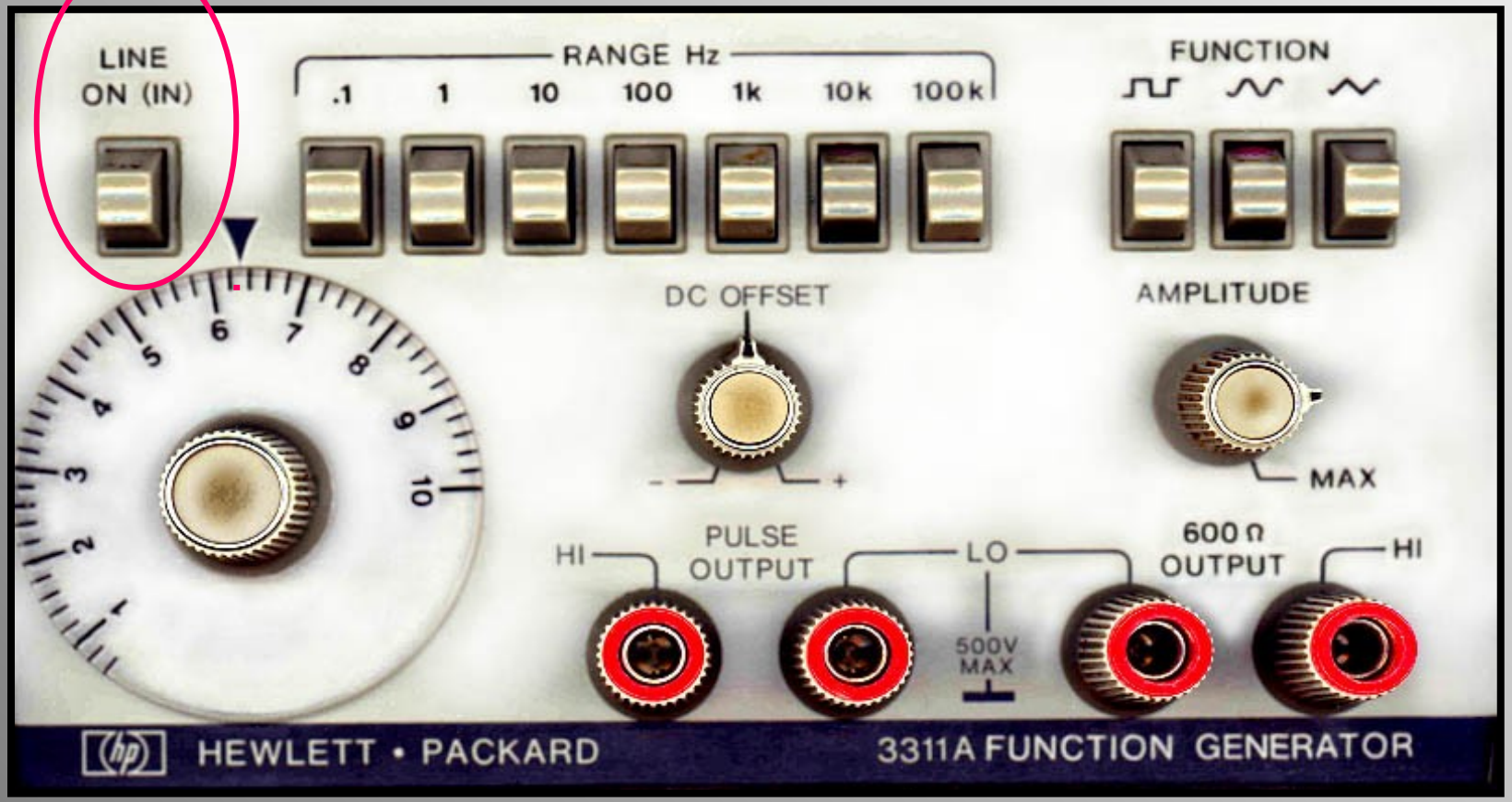


HP Function Generator

AC: Test Equipment

Function Generator, HP 3311A; Line Switch.

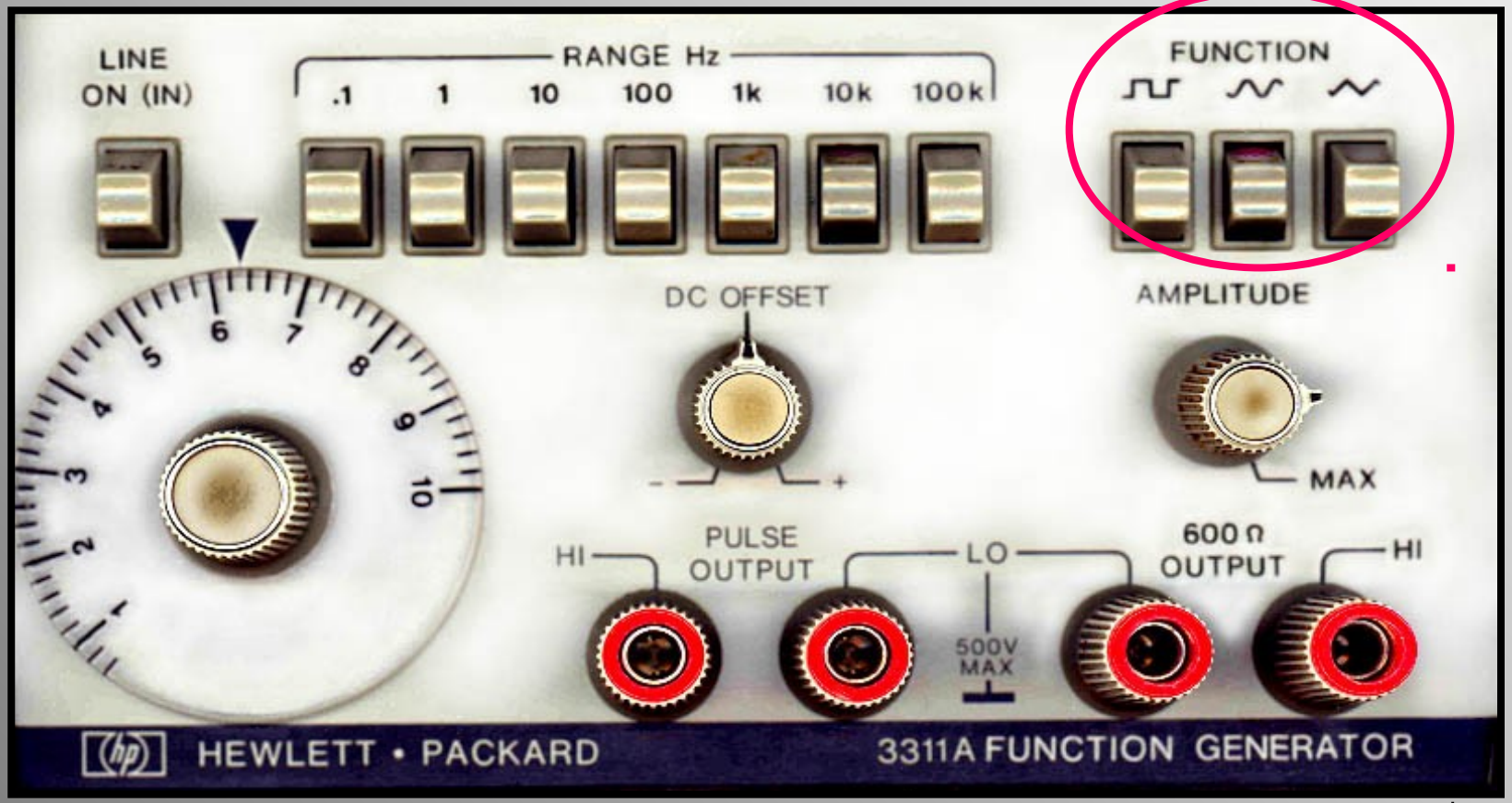
On / OFF Switch



Function Sw.

AC: Test Equipment

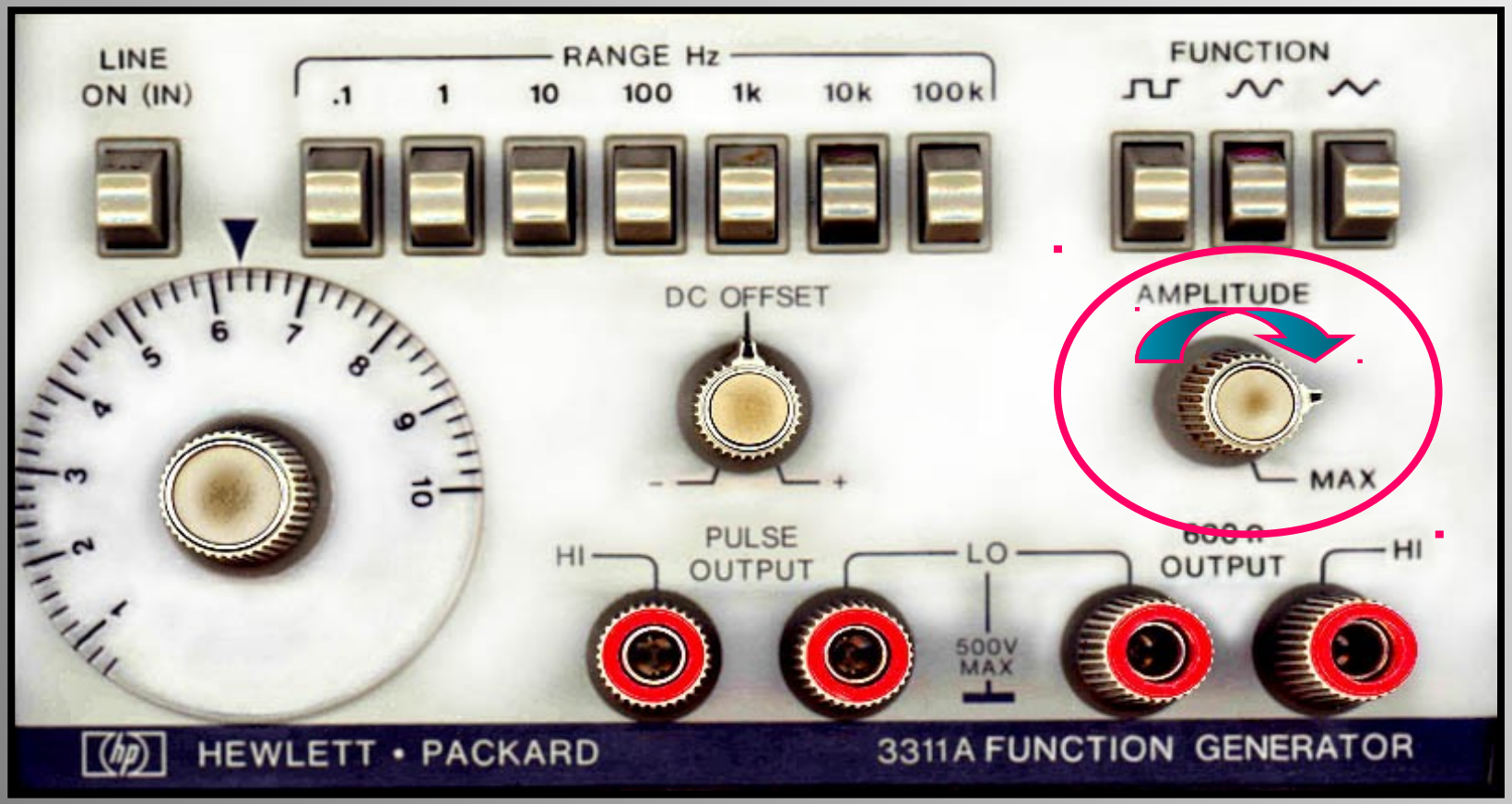
Function Generator , HP 3311A; **Function Switch.**



Amplitude

AC: Test Equipment

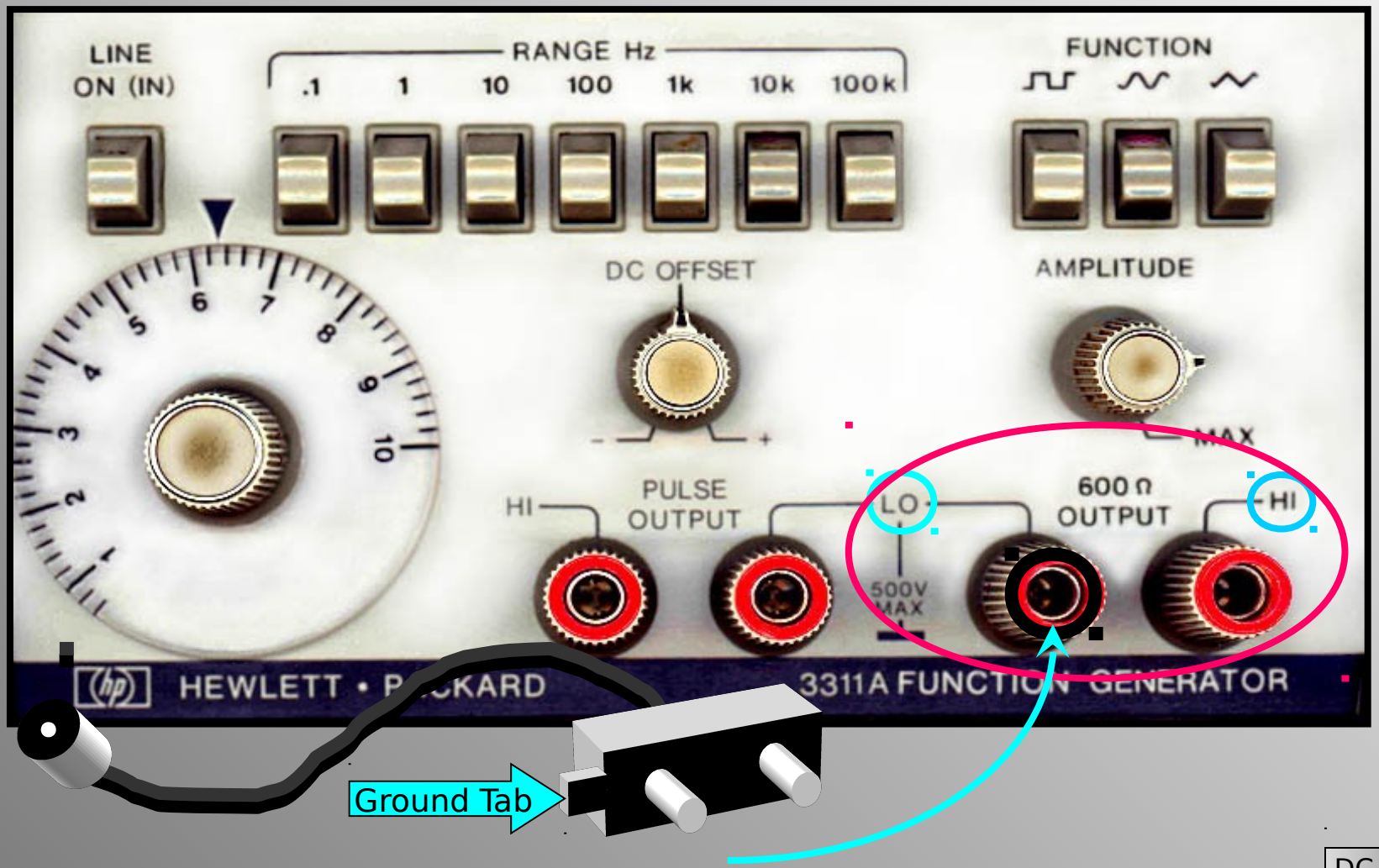
Function Generator , HP 3311A; Amplitude Knob.



Output Jack

AC: Test Equipment

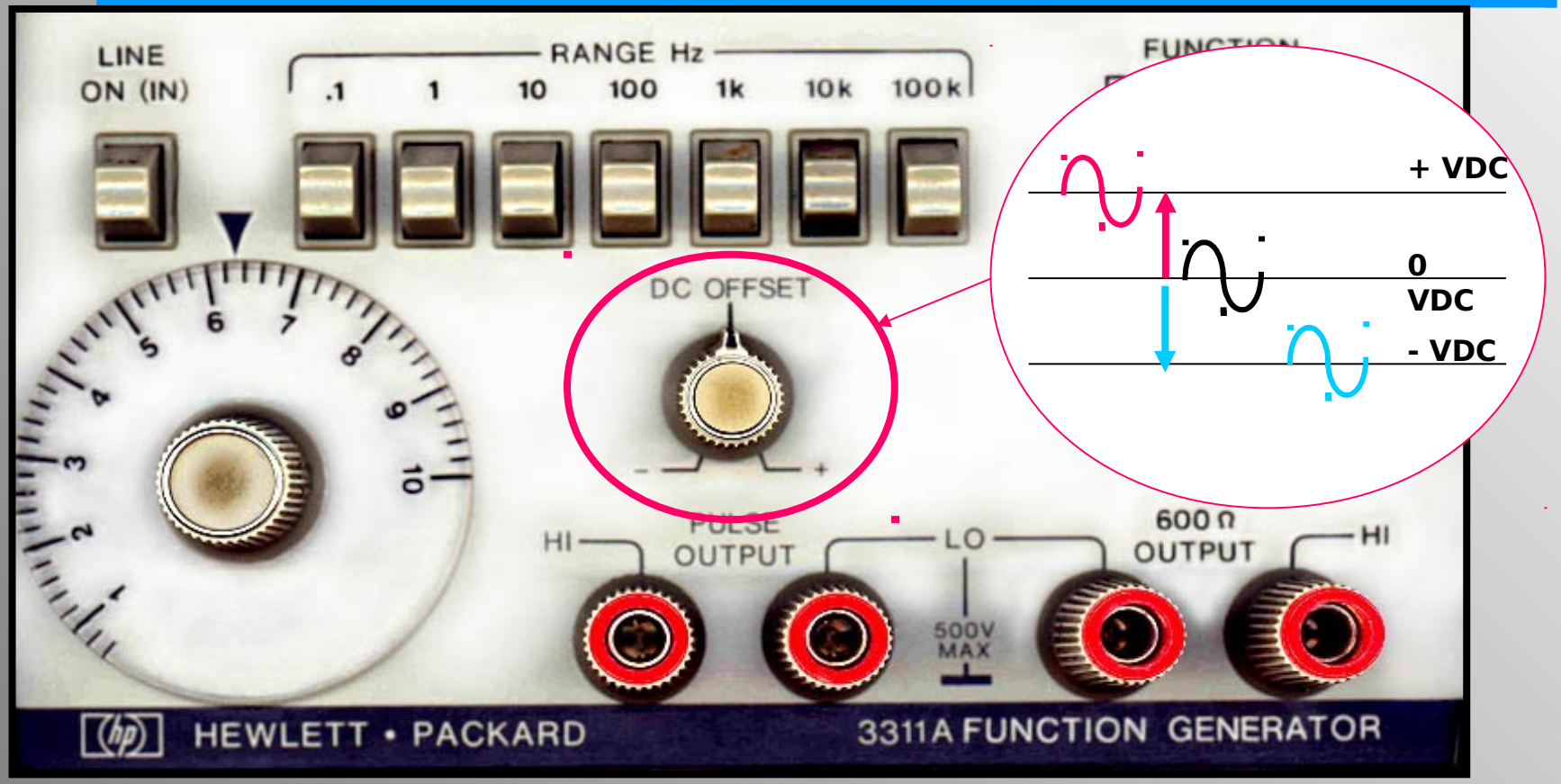
Function Generator , HP 3311A; Output Jack.



DC Offset

AC: Test Equipment

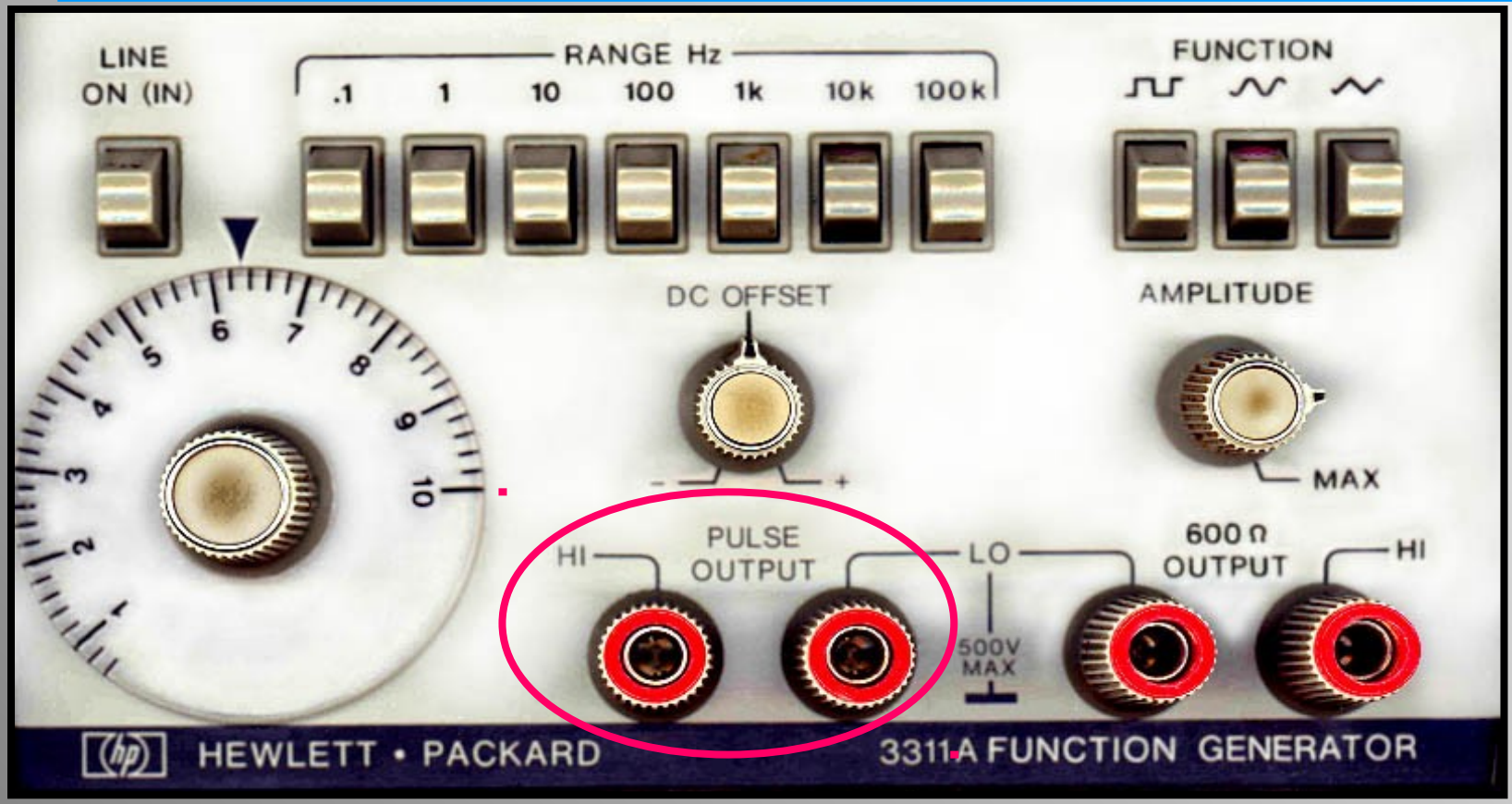
Function Generator, HP 3311A; DC Offset. [Not used in the classroom]



Pulse Output

AC: Test Equipment

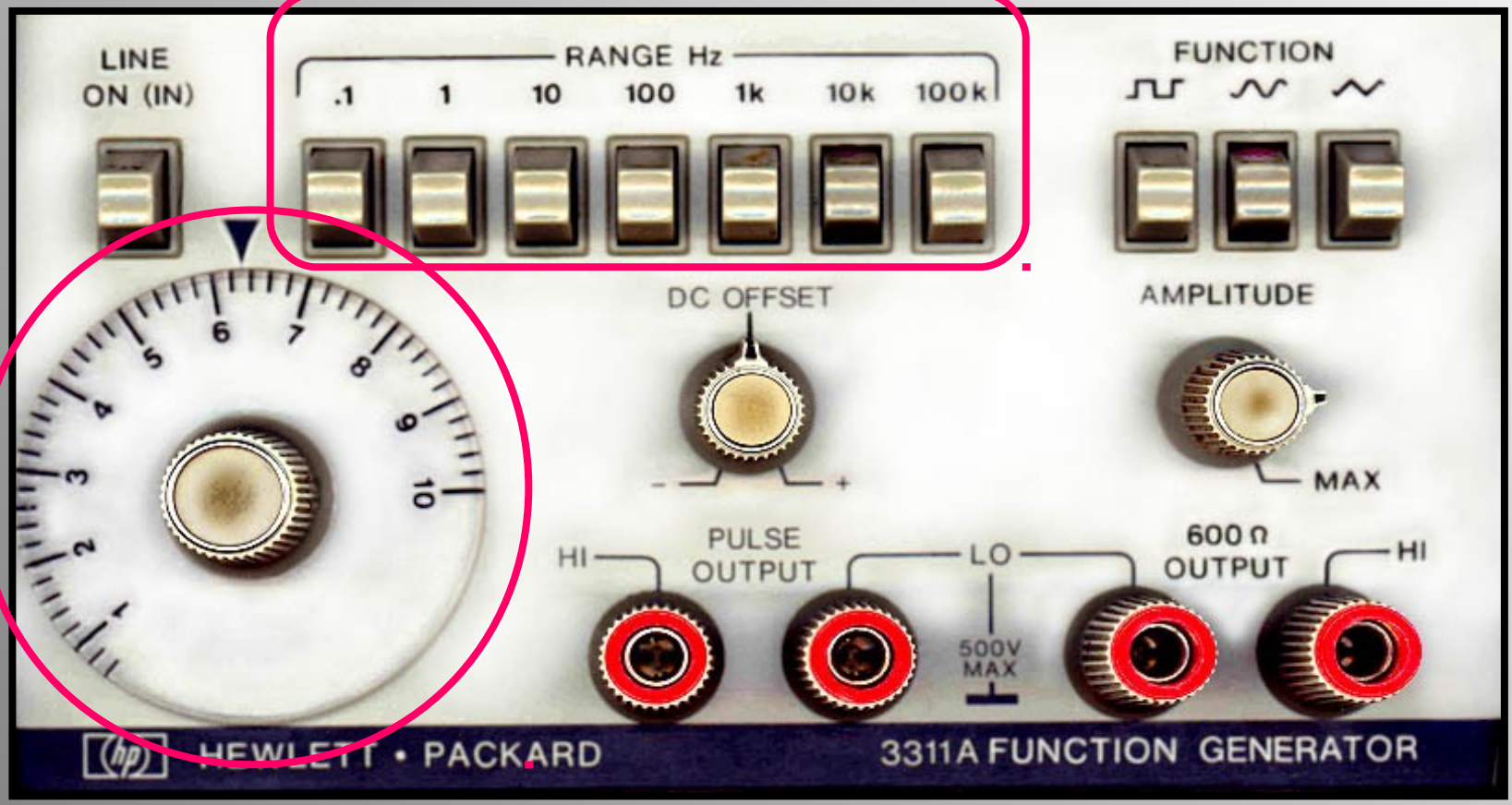
Function Generator, HP 3311A; Pulse Output. [Not used in the classroom]



Multiplier Dial

AC: Test Equipment

Function Generator HP 3311A; Multiplier Dial.



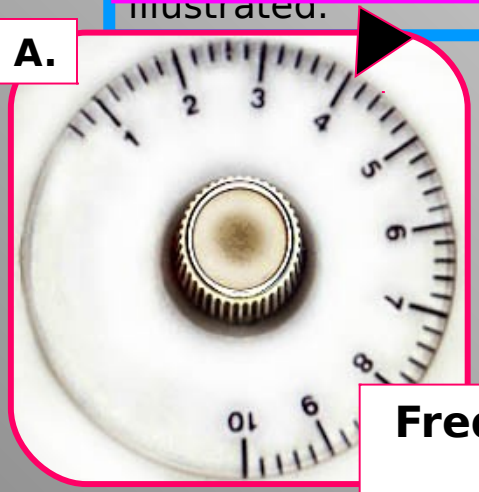
Challenge

AC: Test Equipment

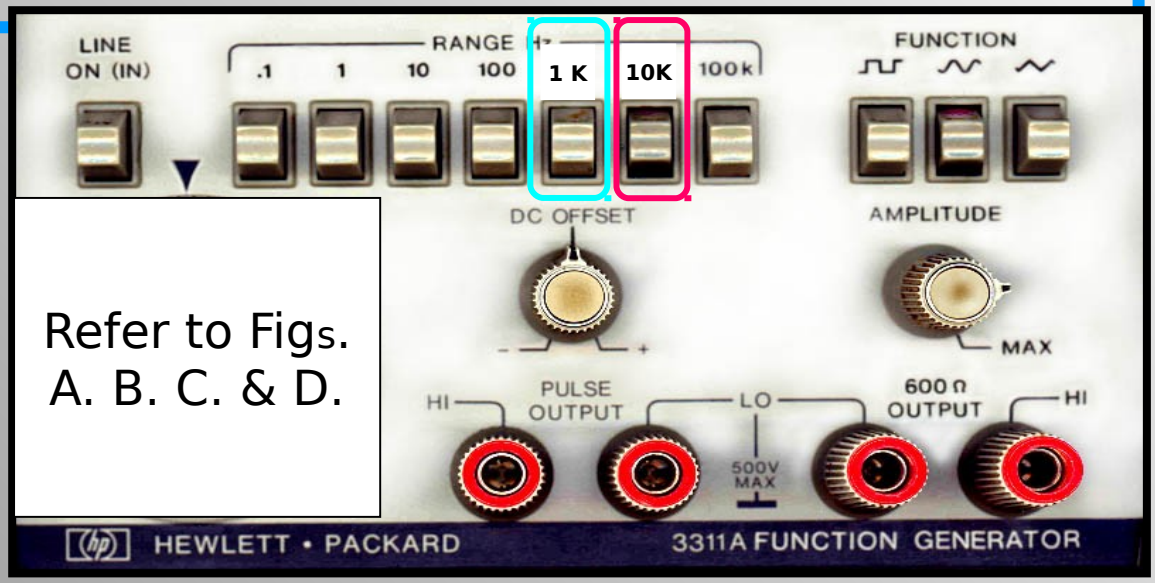
Function Generator; Multiplier Dial.
Reference the Range illustrated.

What is the output Freq, Sw & Dial position as

A.

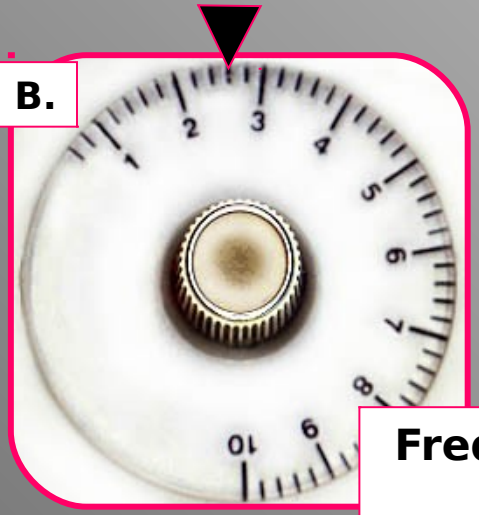


Freq= _____



Refer to Figs. A. B. C. & D.

B.

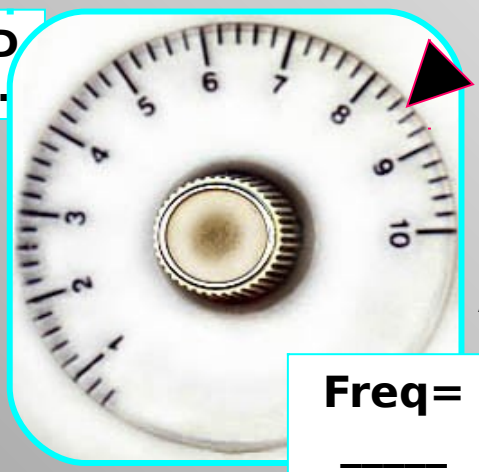


Freq= _____

C.

Freq= _____

D.



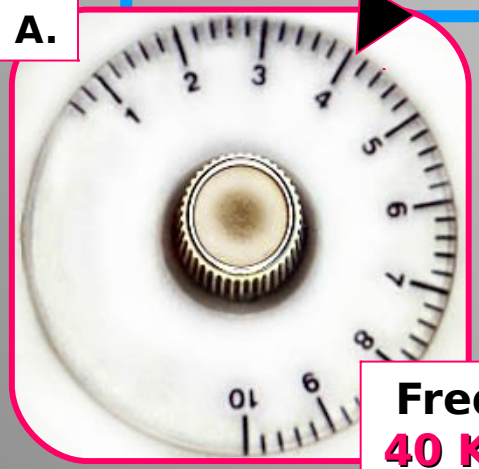
Freq= _____

Answers

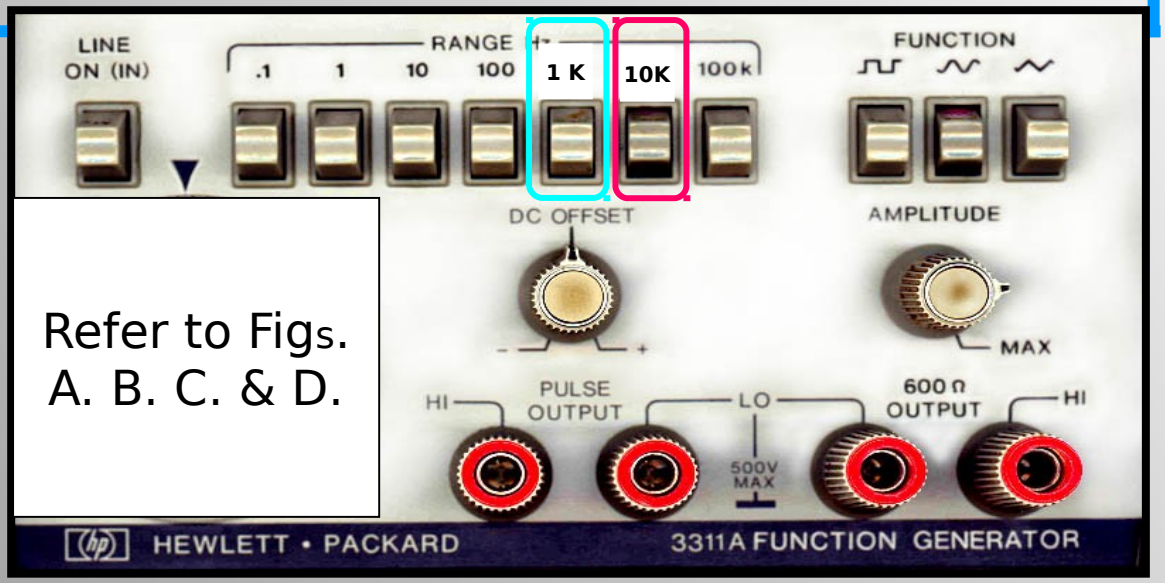
AC: Test Equipment

Function Generator; Multiplier Dial. What is the output Freq, Sw & Dial position as Reference the Range illustrated.

A.

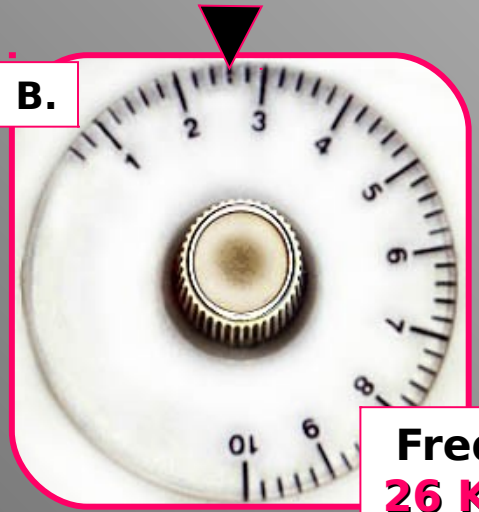


Freq= 40 KHz



Refer to Figs. A. B. C. & D.

B.



Freq= 26 KHz

C.

Freq= 1 KHz

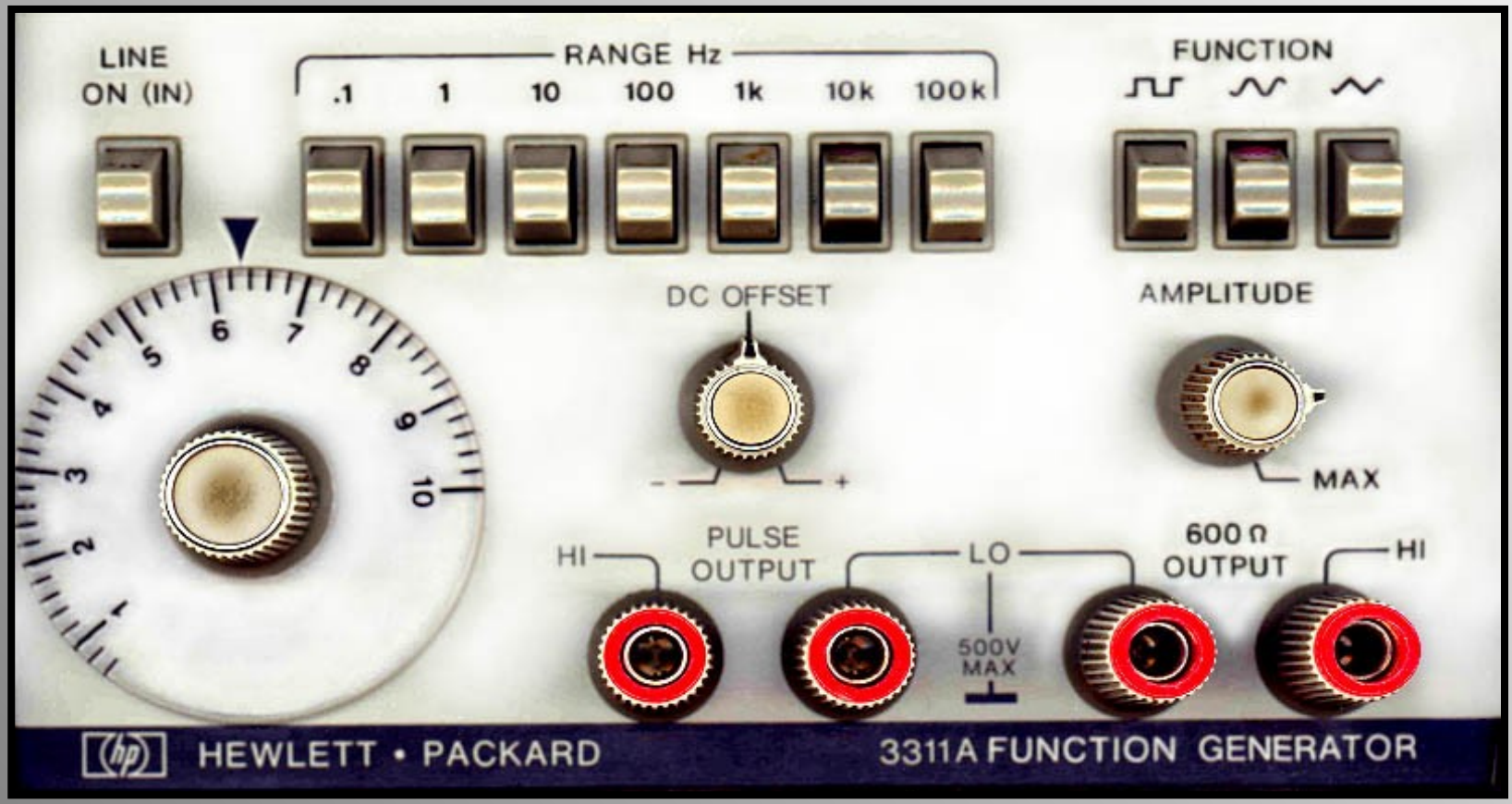
D.

Freq= 8.45 KHz

Blank

AC: Test Equipment

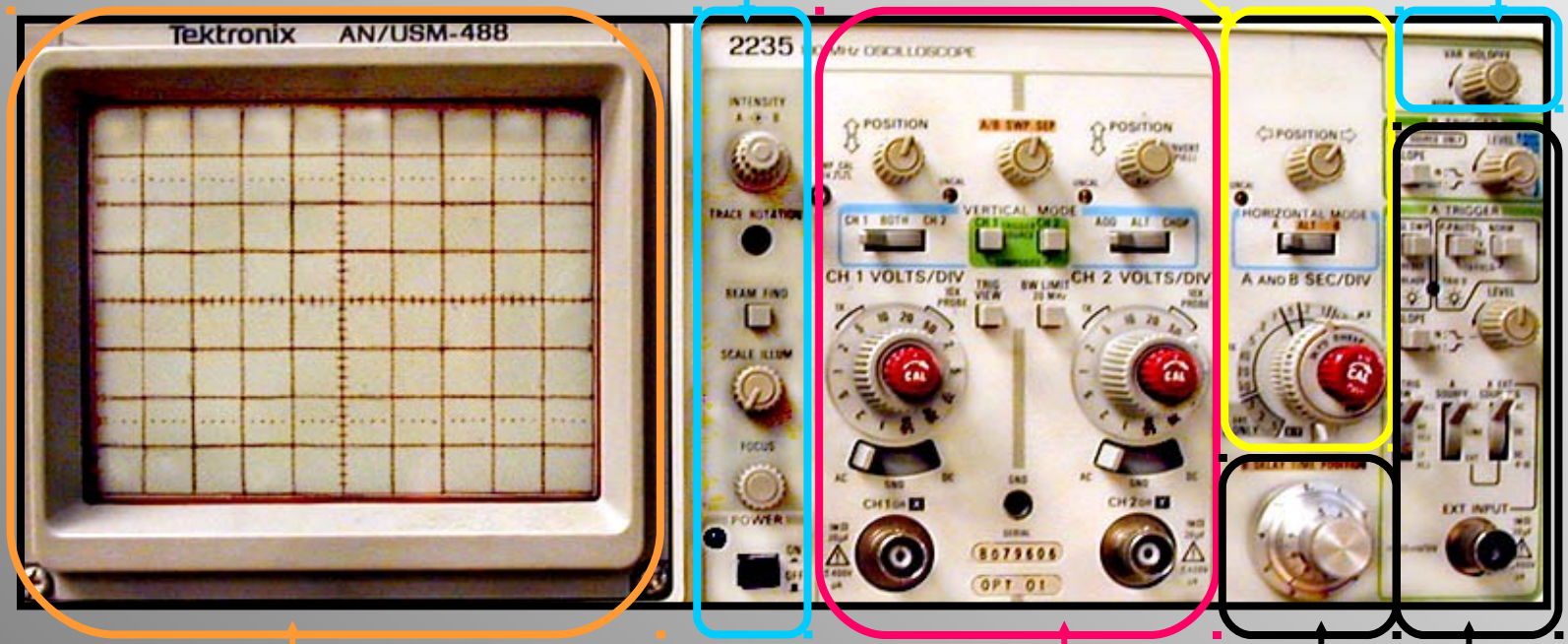
Function Generator, HP 3311A;



O-Scope

AC: Test Equipment

Oscilloscope; Breakdown & ID the Basic Functional Zones.



Display Controls
Power, Focus, Scale Illum, Beam Find, Intensity

SEC / DIV
W/ Left to right signal Positioning

Var
Display Stabilization

Display CRT
W/ Major & Minor Graticule

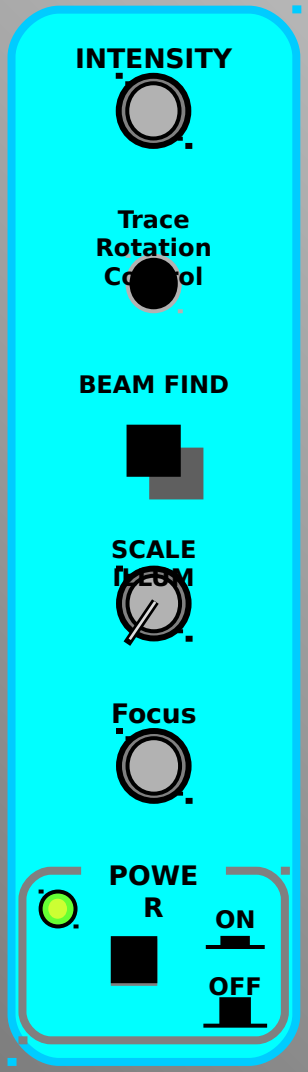
VOLTS / DIV
2 Channels
W/Up & Down signal Positioning

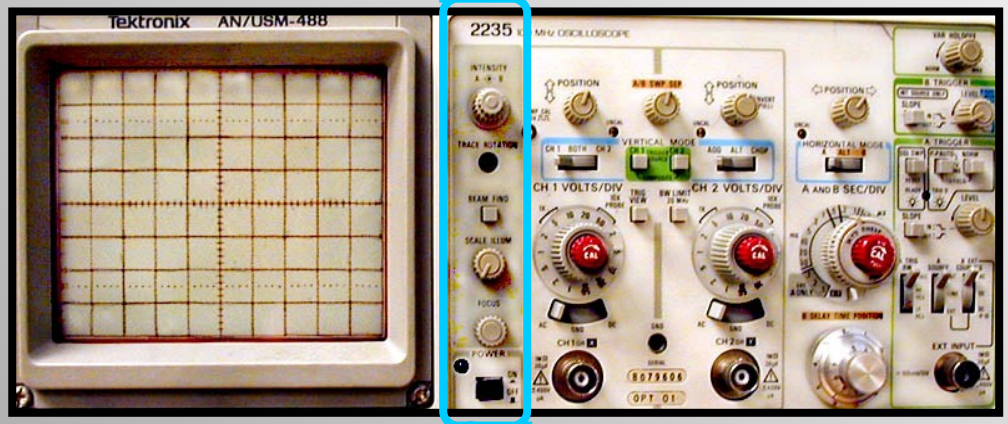
Not used in classroom

Display Controls

AC: Test Equipment

Oscilloscope; Display Controls.

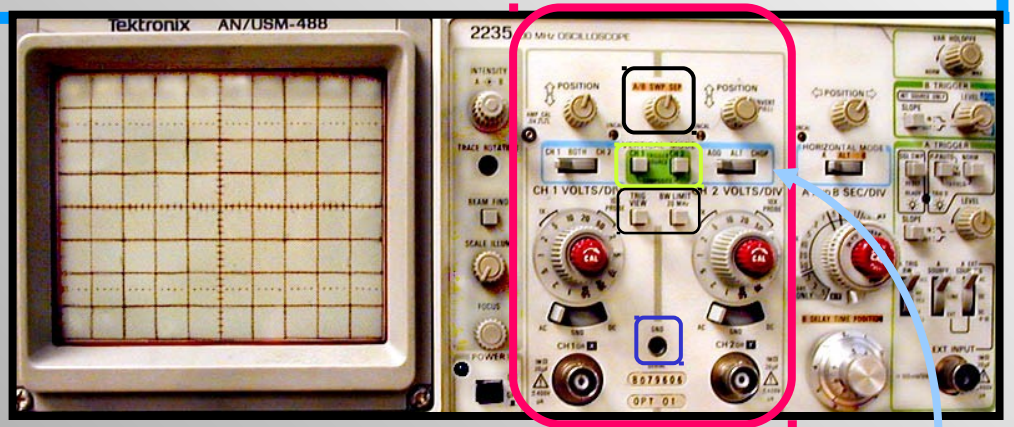


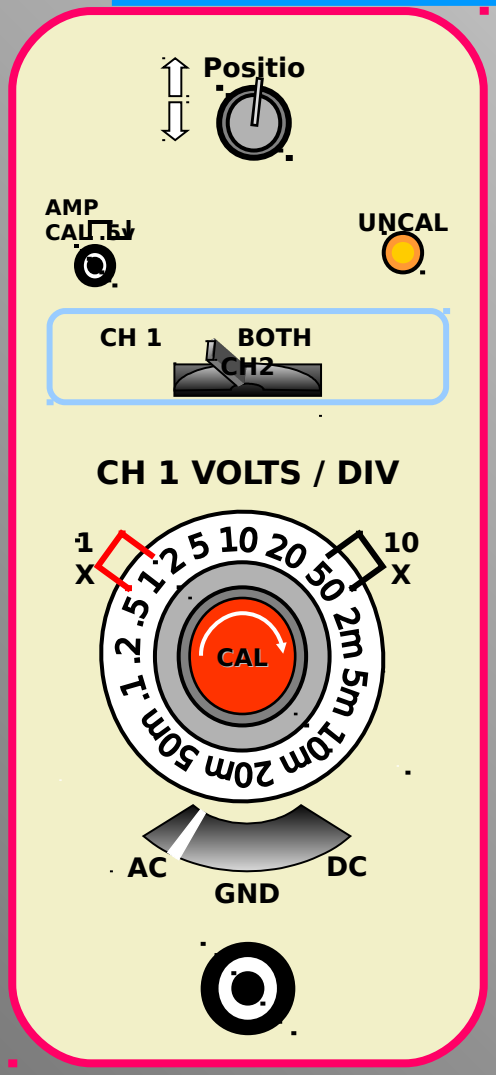


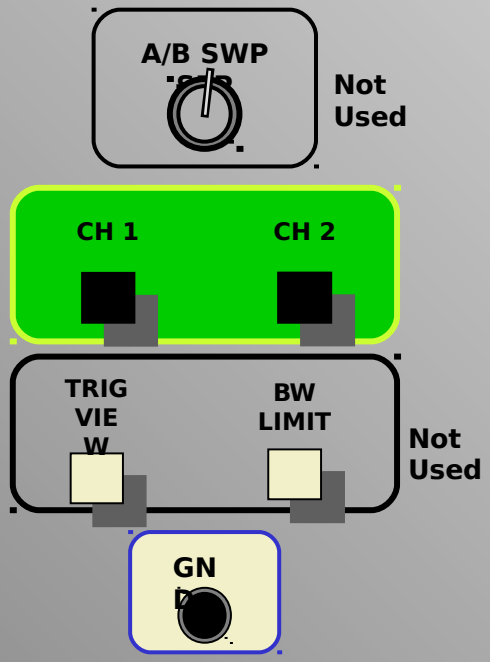
VOLTS/Div

AC: Test Equipment

Oscilloscope; Volts Per Division. 2 Channels major features are the same.



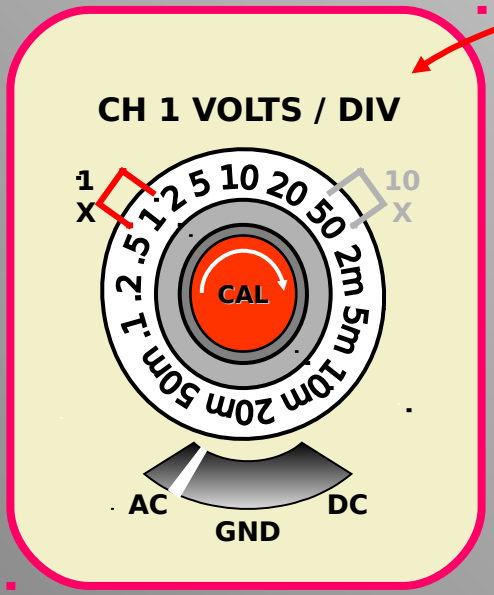


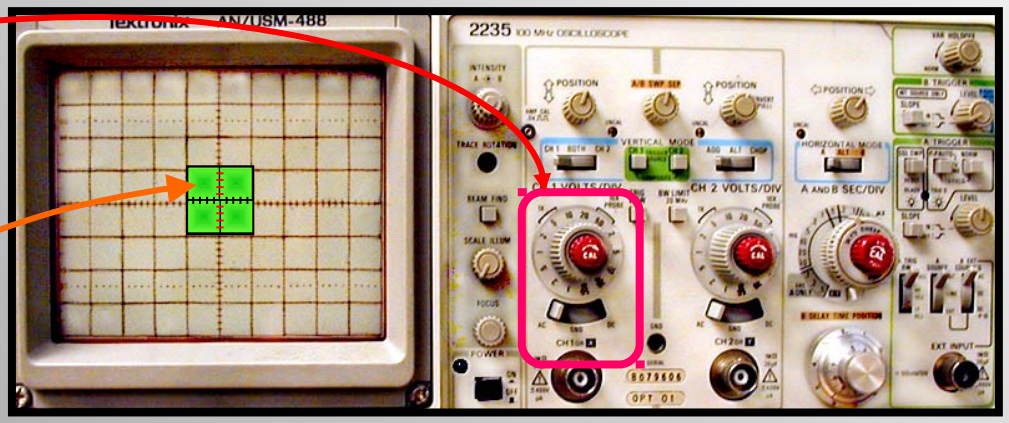


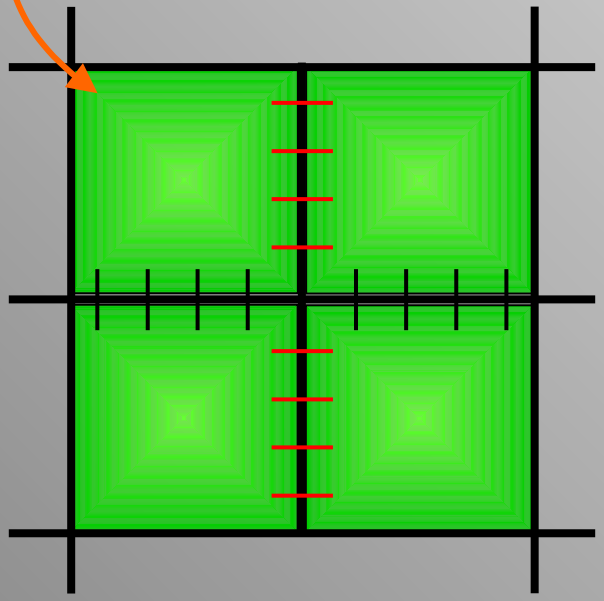
VOLTS/DIV Scale

AC: Test Equipment

Oscilloscope; Determine the Value of Volts Per Division.







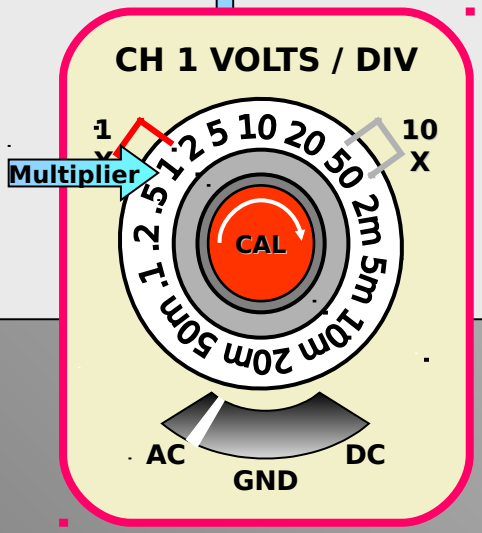
Calculate Volts/Div

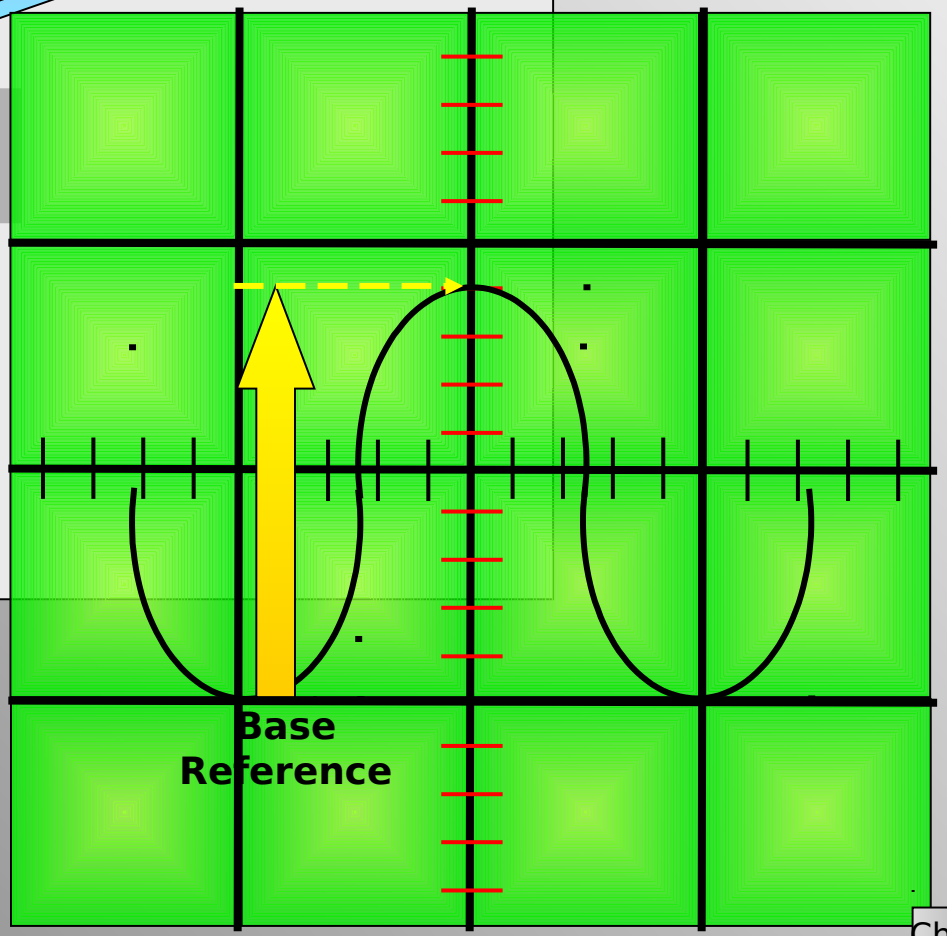
AC: Test Equipment

Oscilloscope; Calculating the signal Voltage.

The Number of BLOCKs X Setting of VOLTS/Div = Vpp

1.8 X 1 = 1.8 Vpp

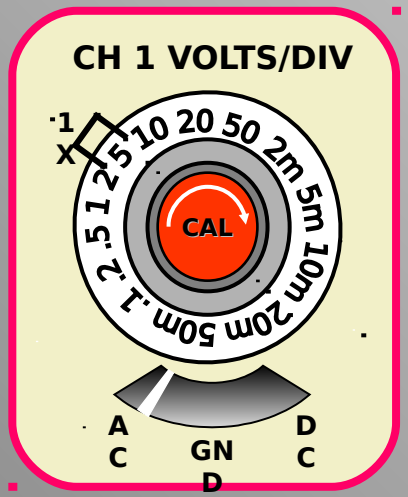


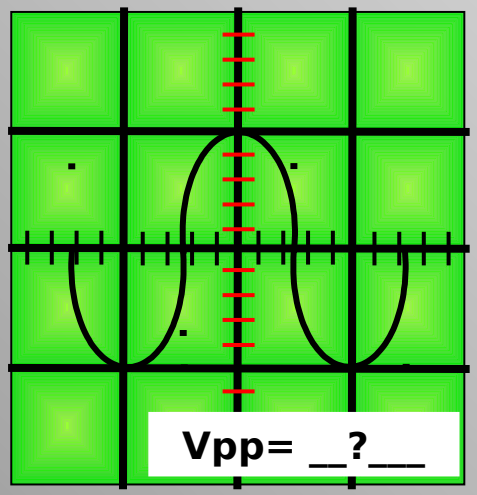


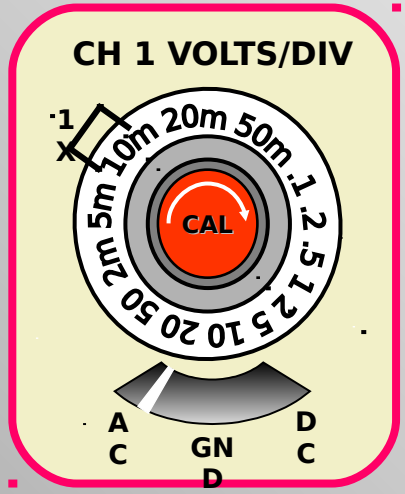
Challenge

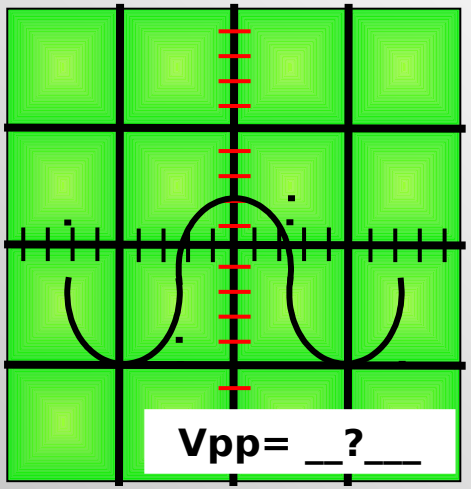
AC: Test Equipment

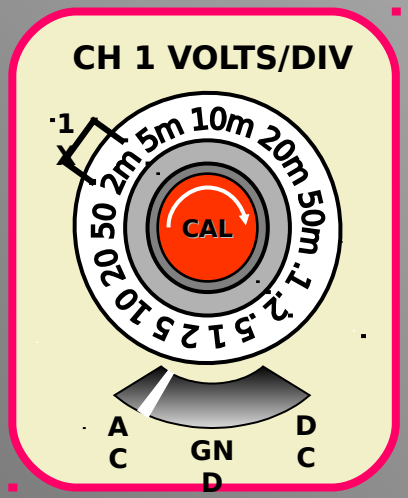
Oscilloscope; Calculate the signal Voltages Illustrated.

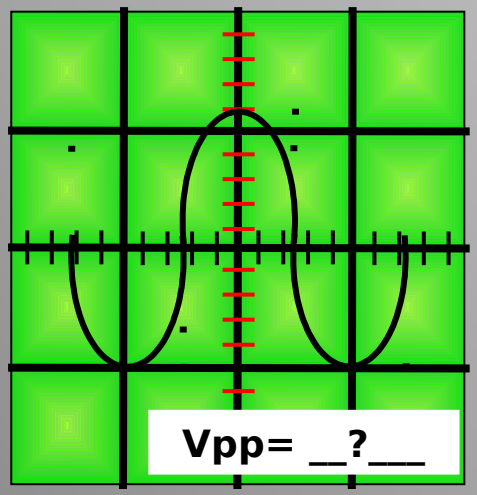


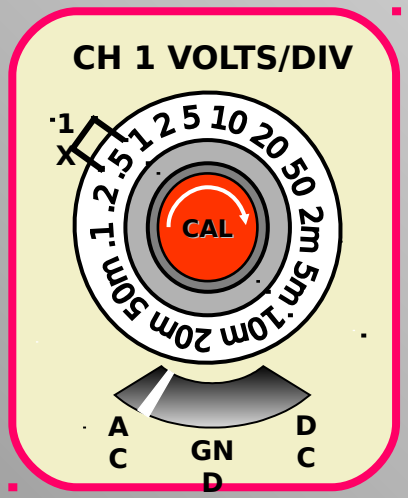


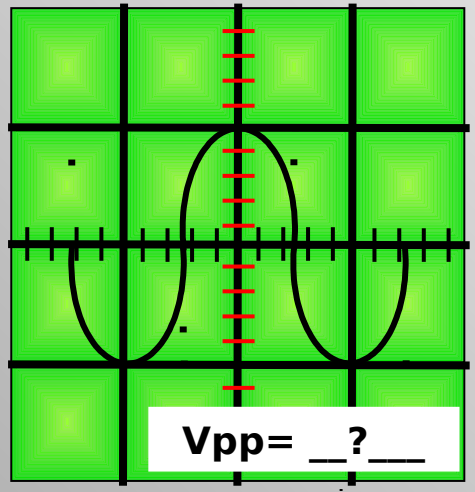










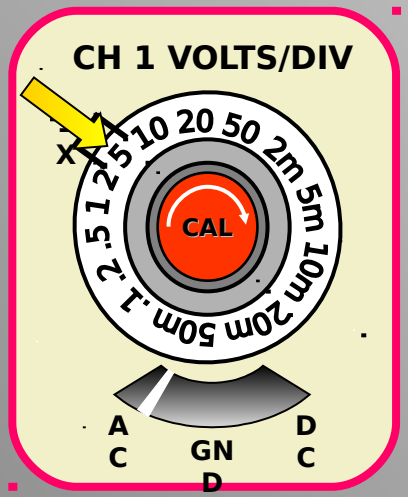


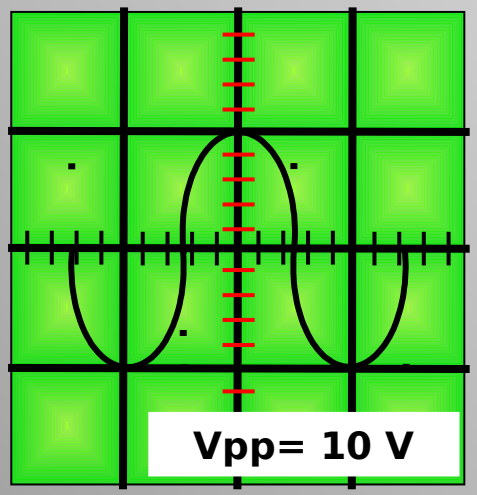
 # BLOCKs X VOLTS/Div

Answers

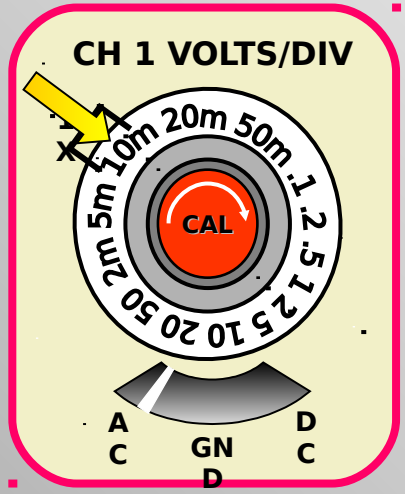
AC: Test Equipment

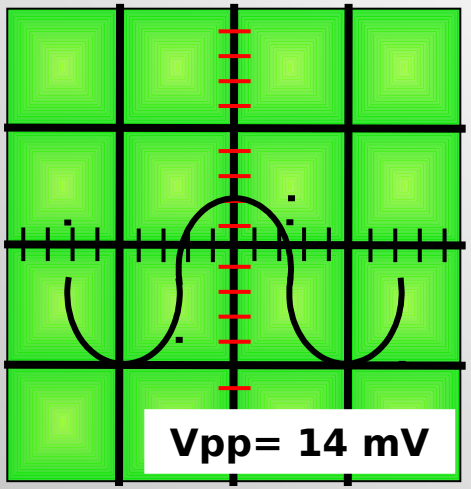
Oscilloscope; Calculate the signal Voltages Illustrated.



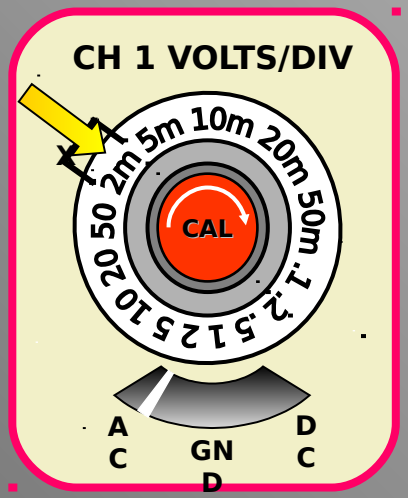


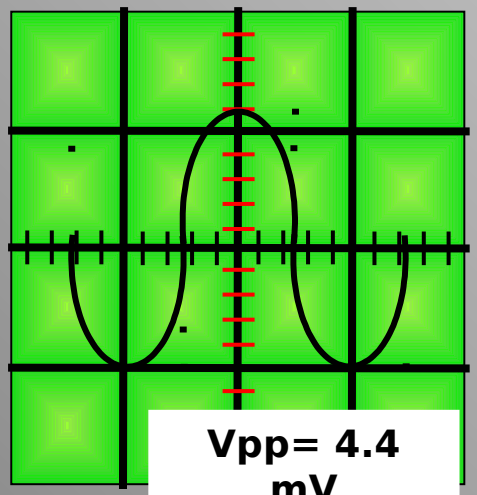
Vpp= 10 V



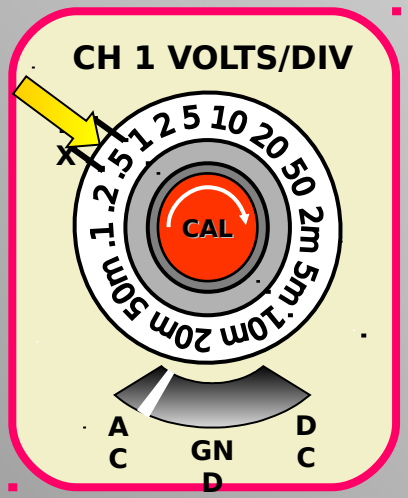


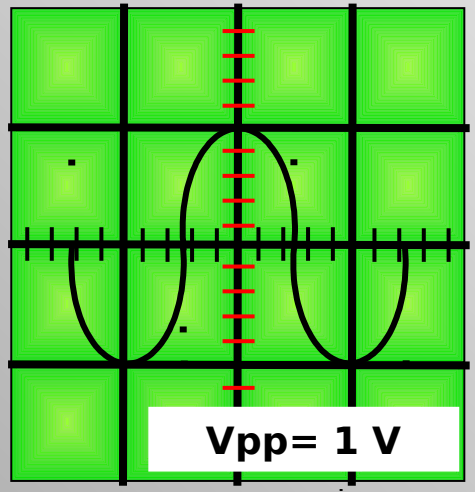
Vpp= 14 mV





Vpp= 4.4 mV





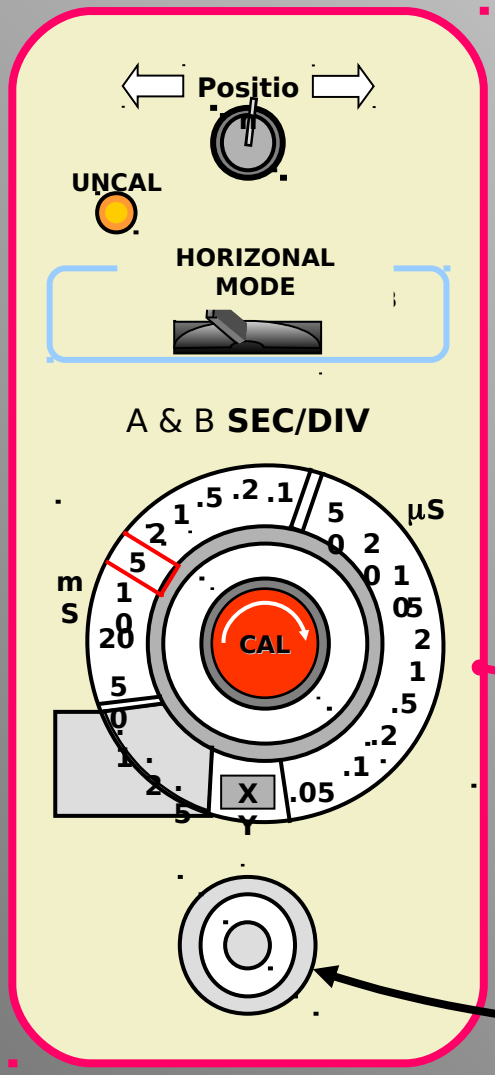
Vpp= 1 V

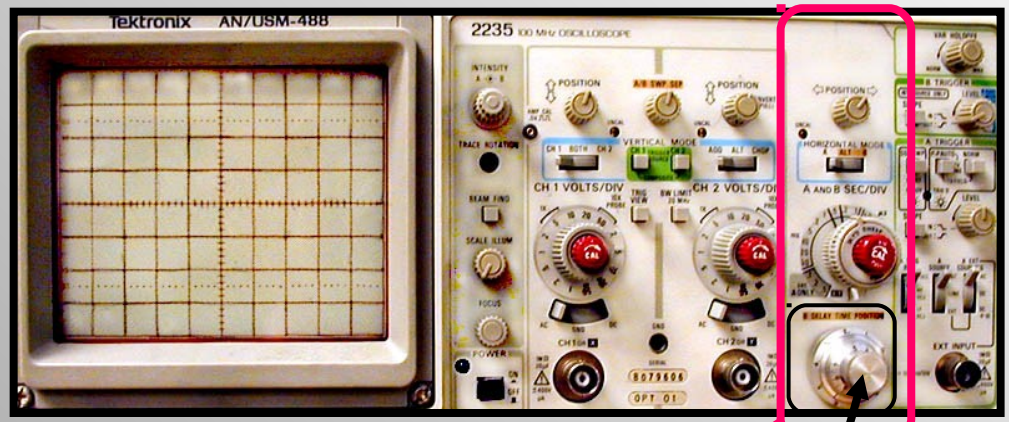
SEC/DIV

 # BLOCKs X VOLTS/Div

AC: Test Equipment

Oscilloscope; Seconds Per Division.



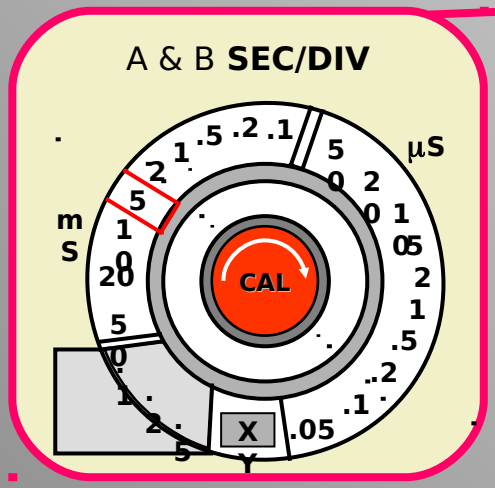


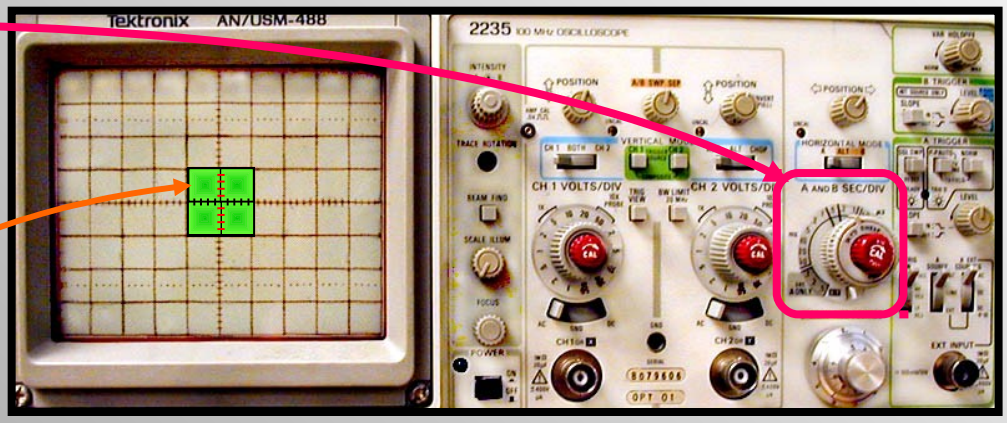
Not Used

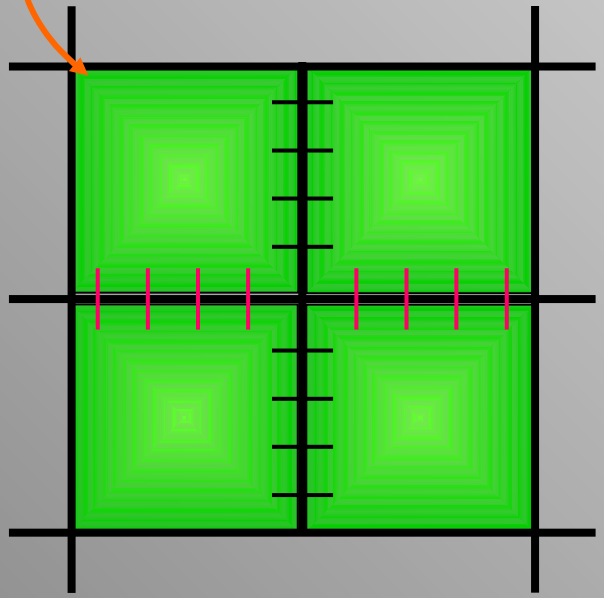
SEC/DIV Scale

AC: Test Equipment

Oscilloscope; Determine the Value of the Seconds Per Division.







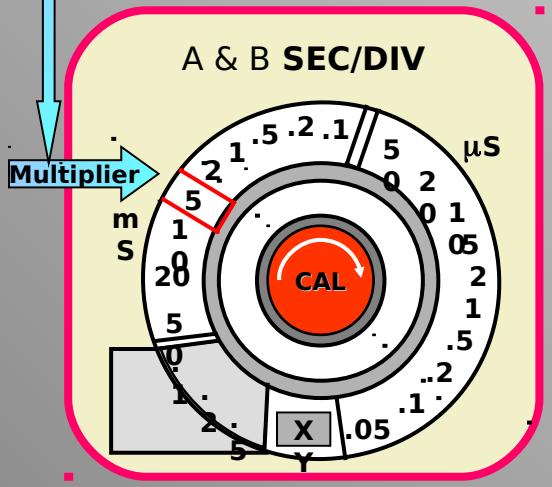
Calculate Period

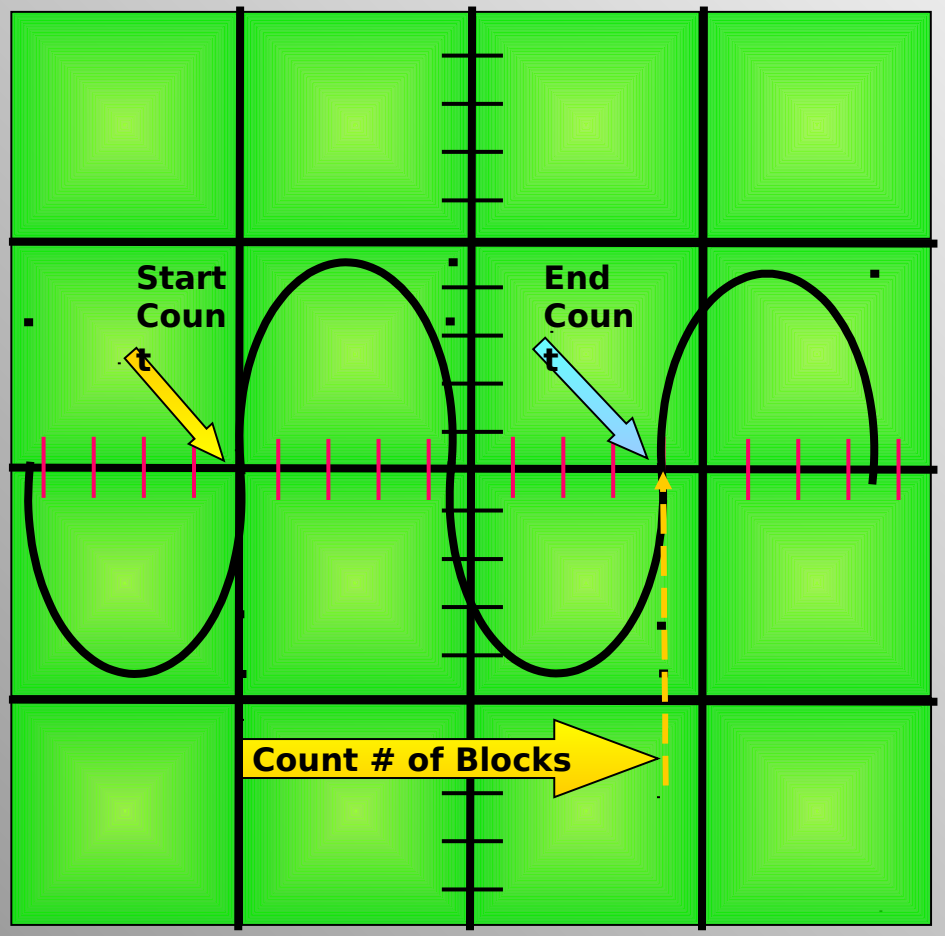
AC: Test Equipment

Oscilloscope; Calculating the PERIOD.

The Number of BLOCKs X Setting of SEC/Div = PERIOD

1.8 X 5 mS = 9 mS





To Determine Frequency:

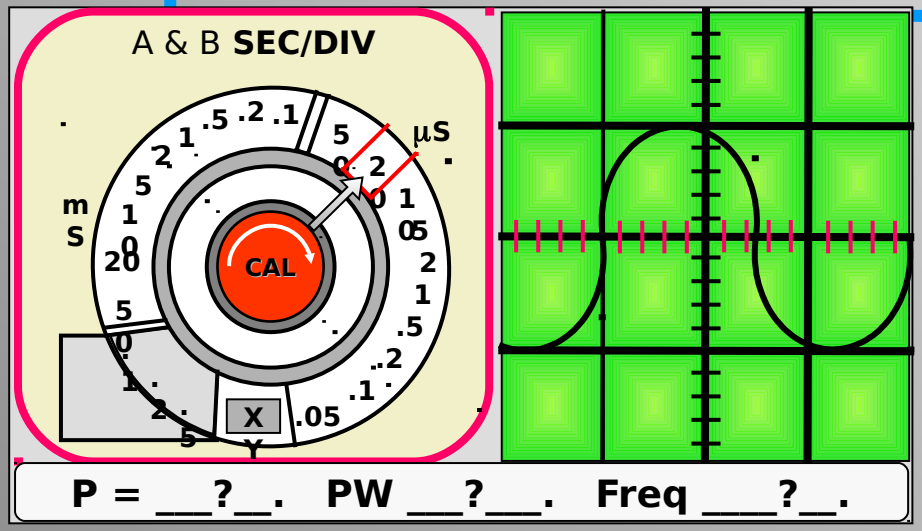
Period 1/X = Frequency

9 mS 1/X = 111.11 Hz

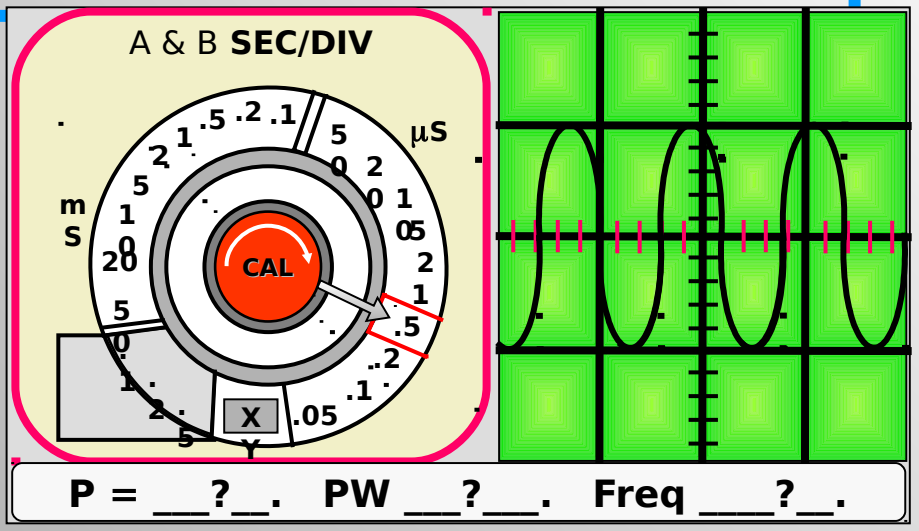
Challenge

AC: Test Equipment

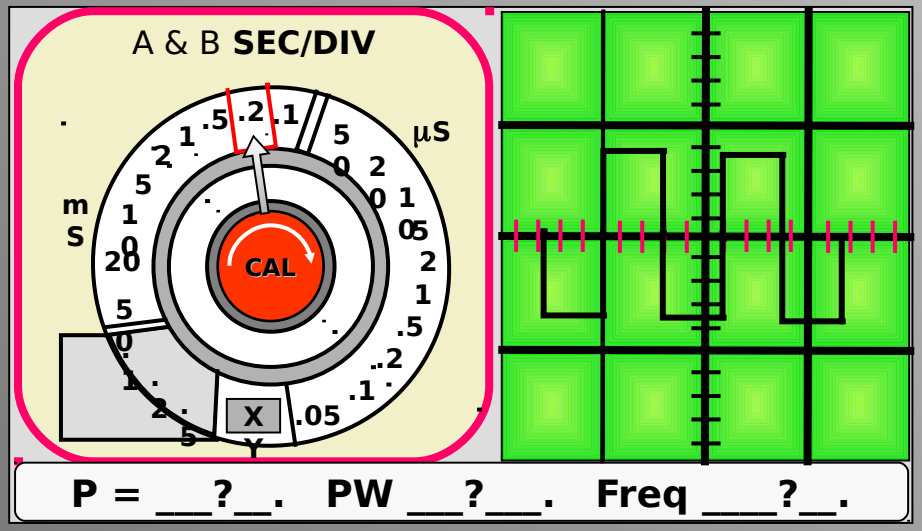
Oscilloscope; Calculate the PERIOD & Frequency For Each Illustration.



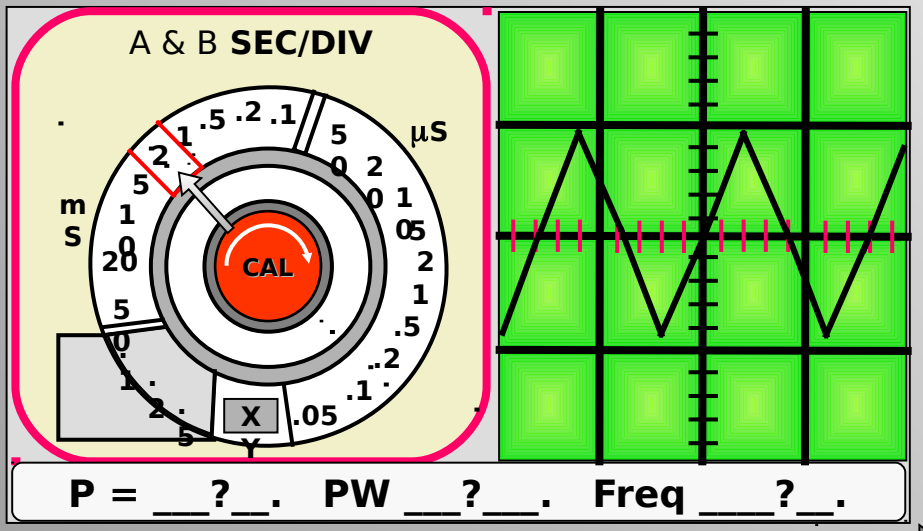
P = ___?__. PW ___?___. Freq ____?__.



P = ___?__. PW ___?___. Freq ____?__.



P = ___?__. PW ___?___. Freq ____?__.



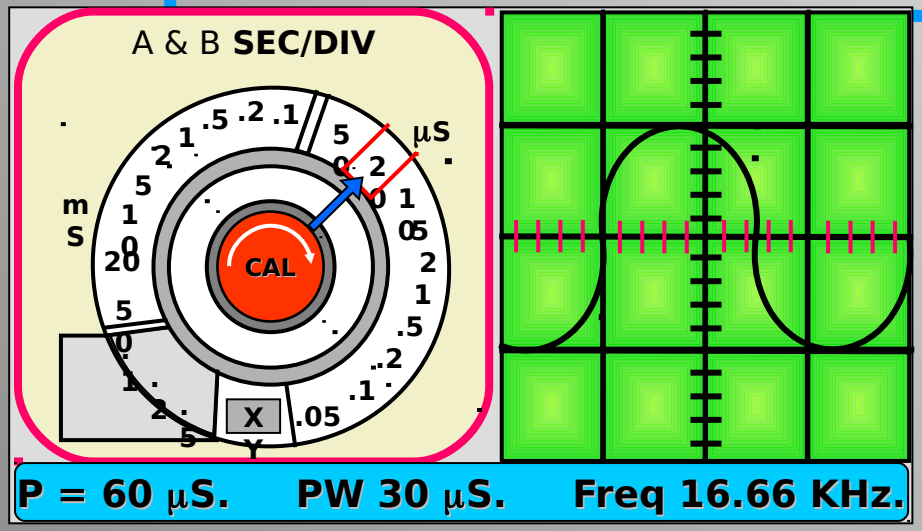
P = ___?__. PW ___?___. Freq ____?__.

 # BLOCKs X SEC/Div = PERIOD. P 1/X=

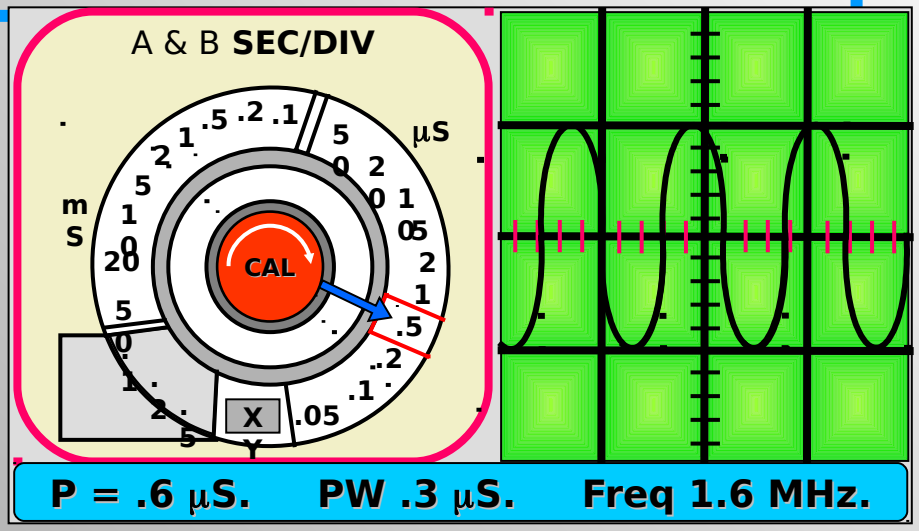
Answers

AC: Test Equipment

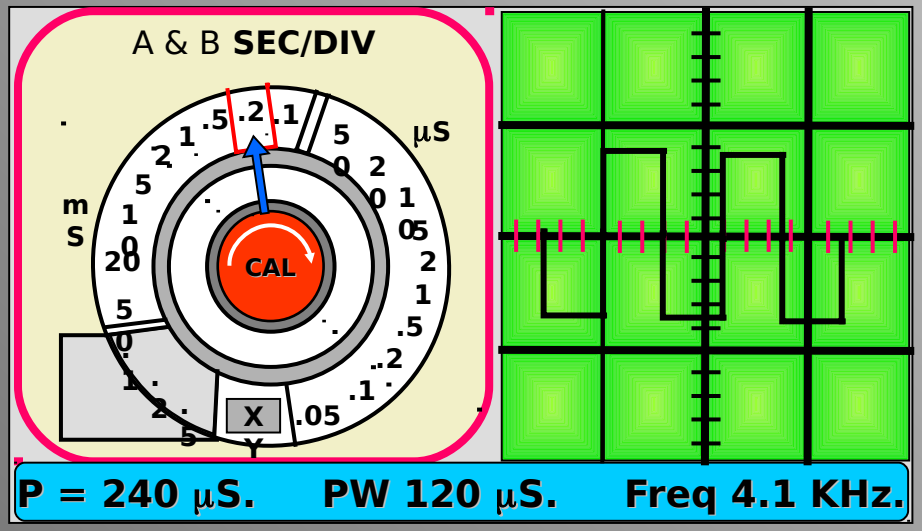
Oscilloscope; Calculate the PERIOD & FREQUENCY for each illustration.



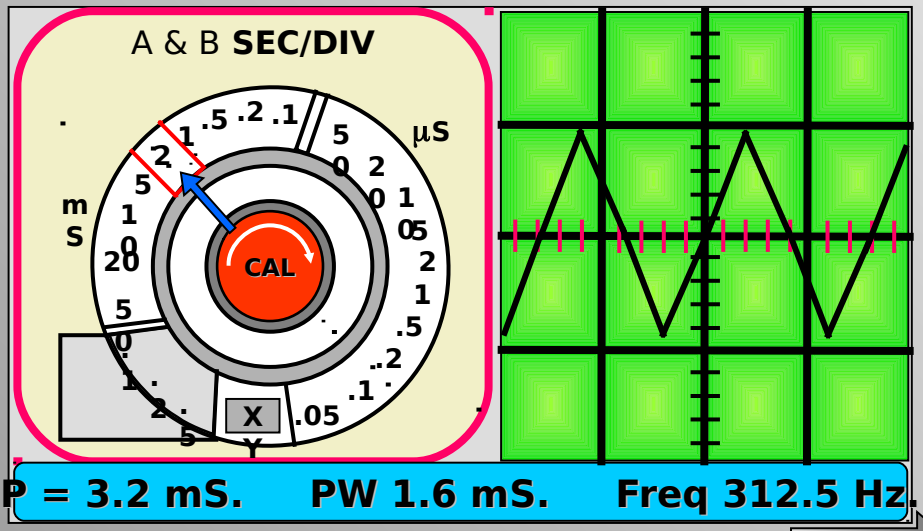
P = 60 µS. PW 30 µS. Freq 16.66 KHz.



P = .6 µS. PW .3 µS. Freq 1.6 MHz.



P = 240 µS. PW 120 µS. Freq 4.1 KHz.



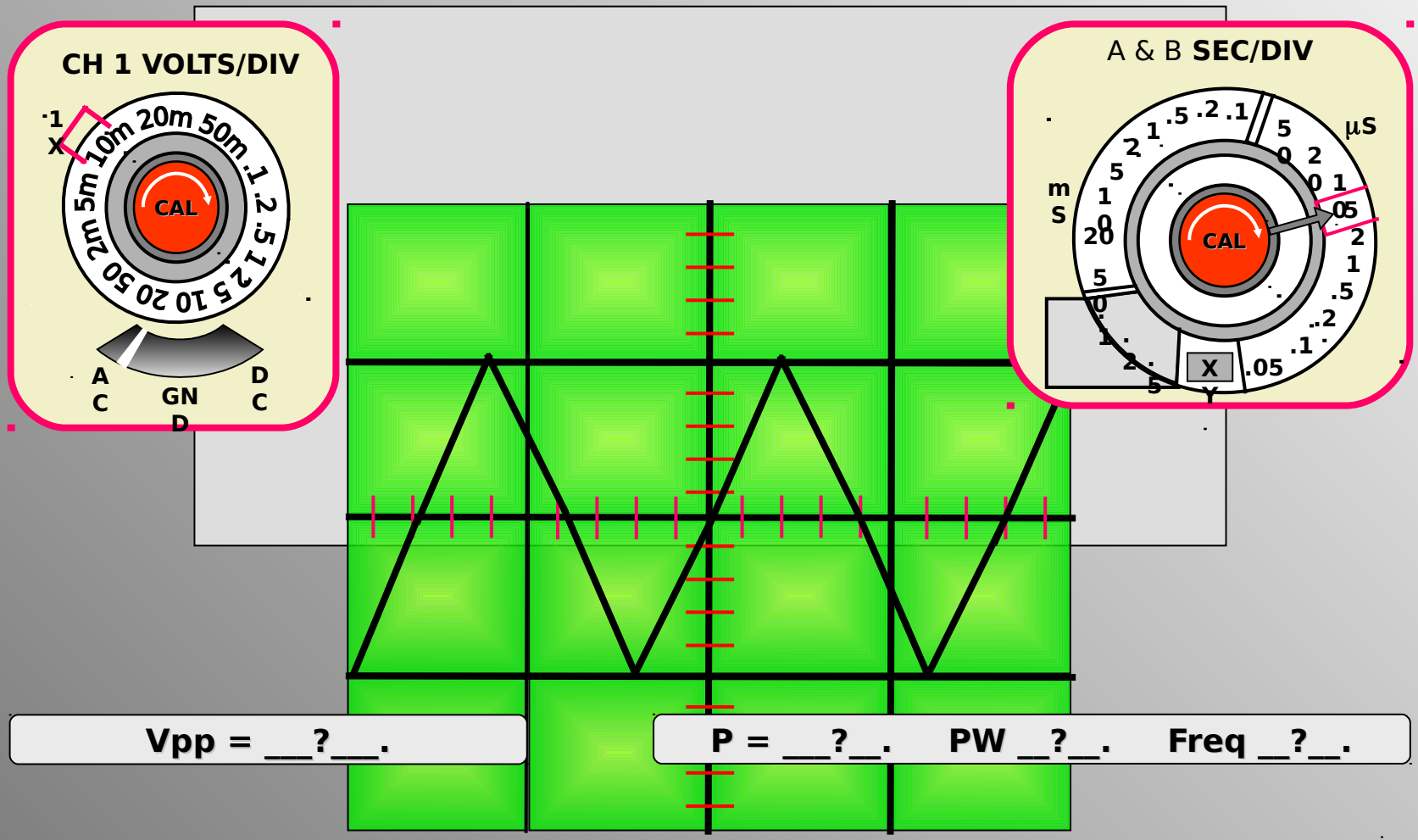
P = 3.2 mS. PW 1.6 mS. Freq 312.5 Hz.

Challenge

 # BLOCKs X SEC/Div = PERIOD. P 1/X=

AC: Test Equipment

Oscilloscope; Calculate the P, PW, Freq, & Voltage.



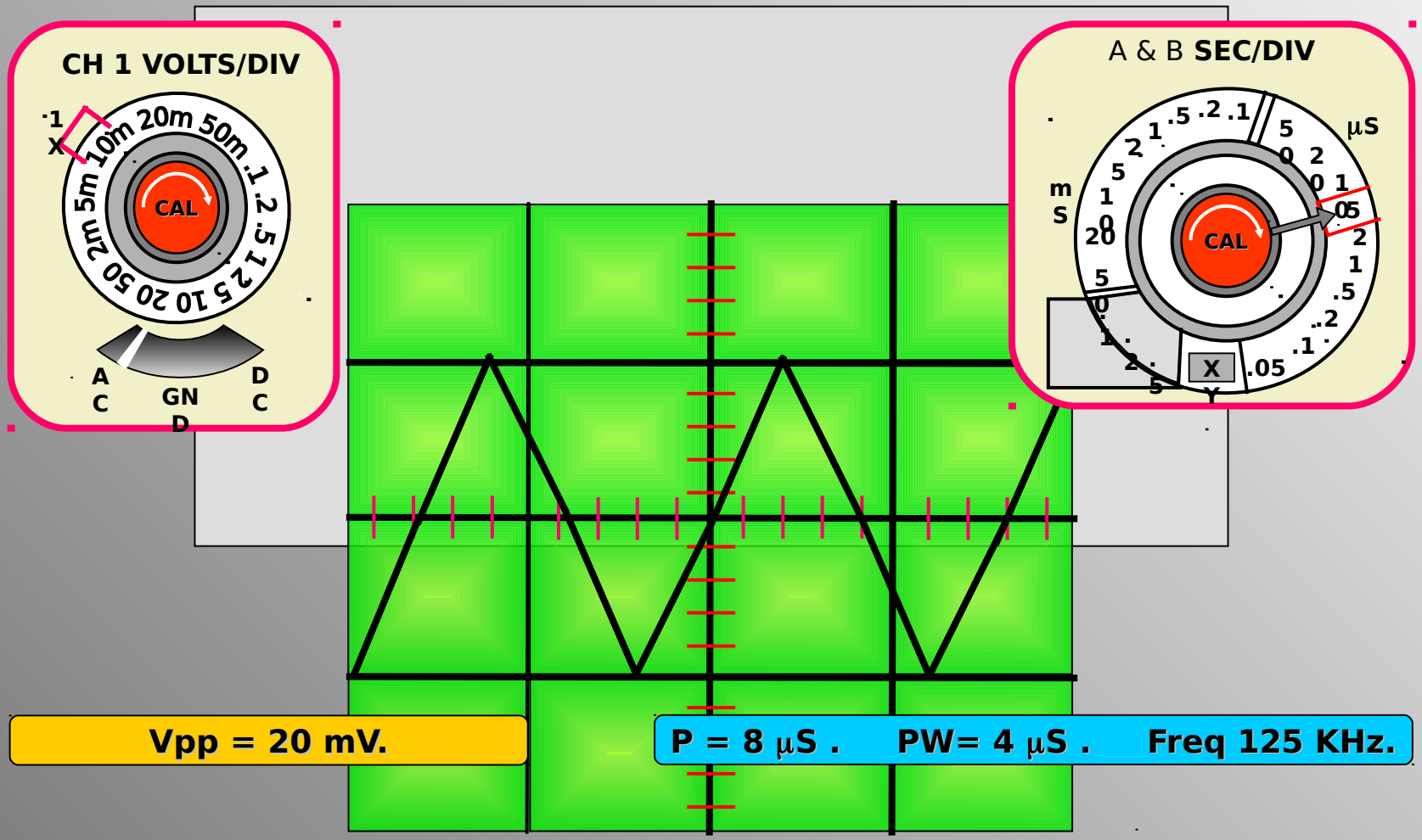
Vpp = ___?___.

P = ___?__. PW __?__. Freq __?__.

Answers

AC: Test Equipment

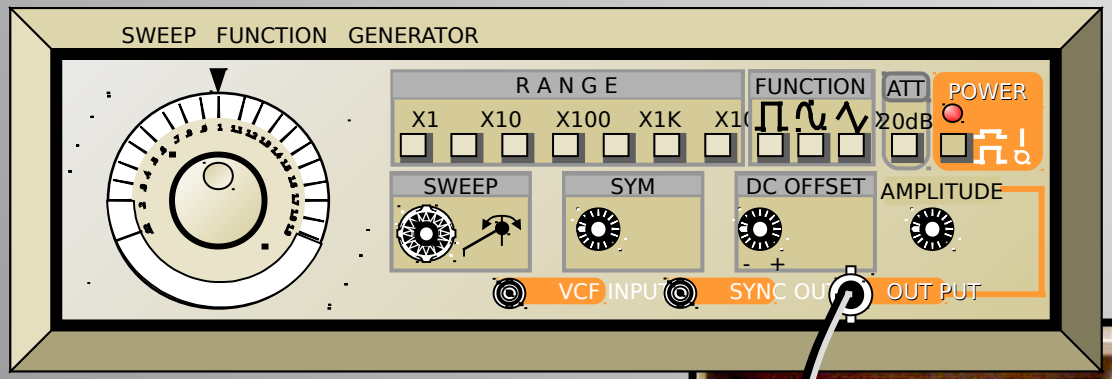
Oscilloscope; Calculate the P, PW, Freq, & Voltage.

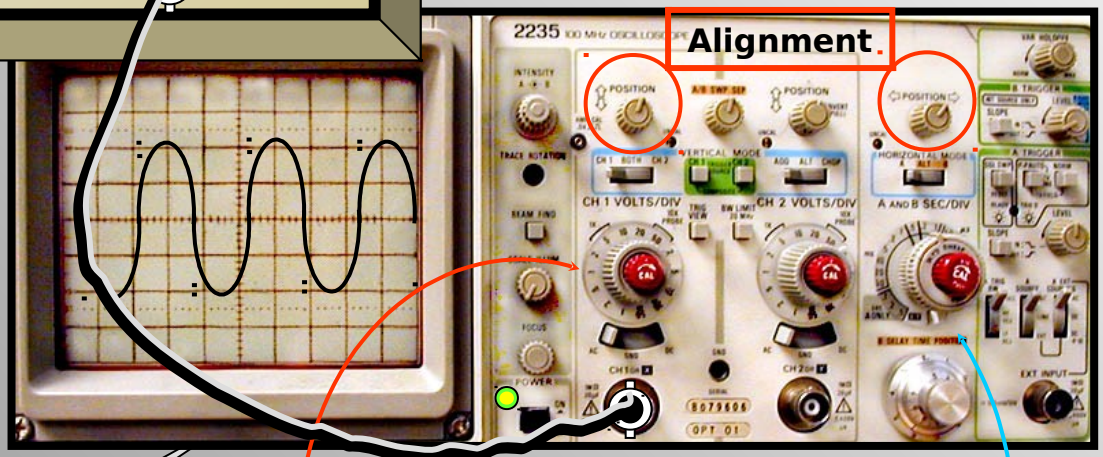


Set up Fun Familiarization

AC: Test Equipment

Fun Exercise;





The Fun part:

Methodically vary the settings of the Function Generator and observe the O-Scope display. Do the same with O-Scope, Volts/Div & Sec/ Div.

COAX

A. Sweep Generator: Setup

1. **Set Range @ 10 KHz**
2. **Set Multiplier to 3** } **3 KHz**
3. **Set Function to ∿**
4. **Set Amplitude; Adjust for 6Vpp <u>after o-scope set up</u>.**
5. **Run Coax from 50 Ω output <u>to</u> Chan 1 input on O-Scope.**
6. **Line switch on.**

B. O-Scope: Setup

1. **Turn on PWR SW.**
2. **Align signal to the center of display.**
3. **Set <u>VOLT/DIV</u> to <u>1 V</u>.**
4. **Set <u>SEC/DIV</u> to <u>.1 mS</u>.**

Go to PE

AC: Test Equipment

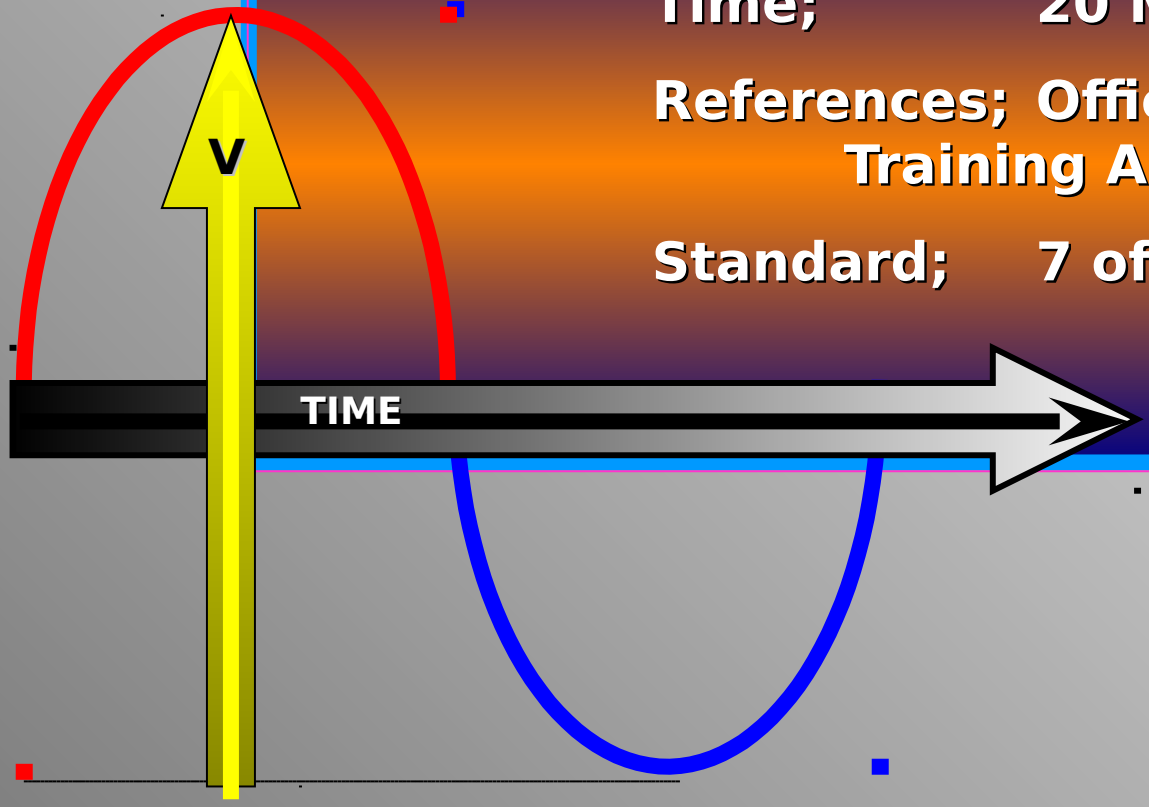
PE & Lesson Test;

LESSON TEST;

Time; 20 Minutes.

References; Official OMEMS Training Aids.

Standard; 7 of 10 minimum.



PE:

Start @ JOB 2 in PE
NIDA Directions
{Desktop} &
workbook